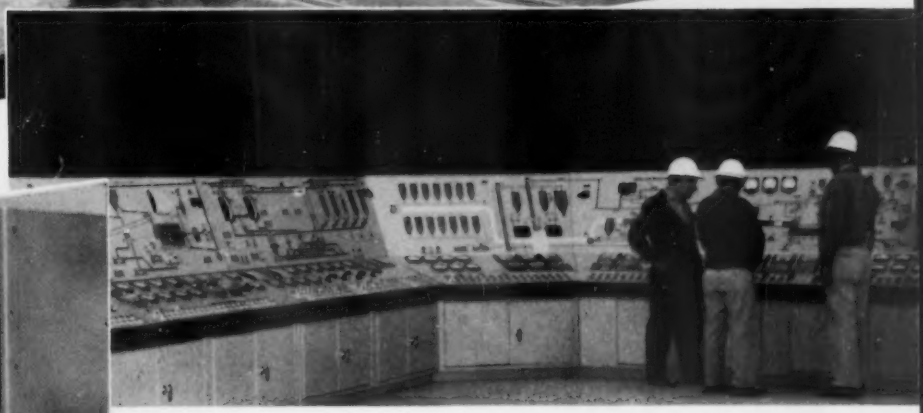
pit and quarry

THE BASIC MAGAZINE IN A BASIC INDUSTRY

CEMENT, LIME, GYPSUM, CRUSHED STONE, SAND, GRAVEL AND OTHER NONMETALLIC MINERALS

JULY 1961



Automation Concept at Dewey's Tulsa Plant

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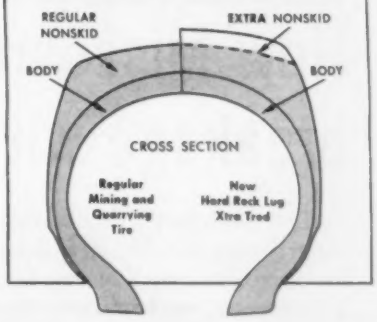

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PIT and QUARRY

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CEMENT

Oklahoma Cement Co.

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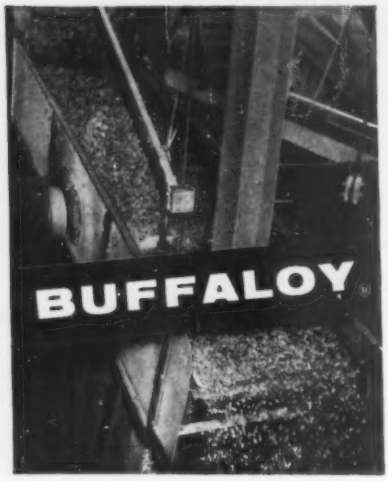

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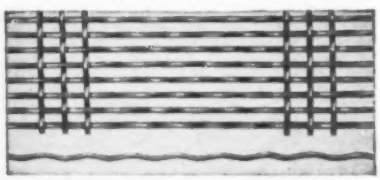

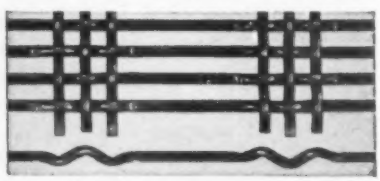

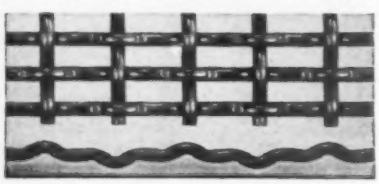

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Monarch Cement Co., Humboldt, Kas.

Standard Industries, Tulsa, Okla.

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Diamond makes everything for the aggregate producer:

Jaw Crushers • Roll Crushers • Conveyors • Screens and Washers • Feeders and Bins • Portable and Stationary Crushing Plants for Rock and Gravel.

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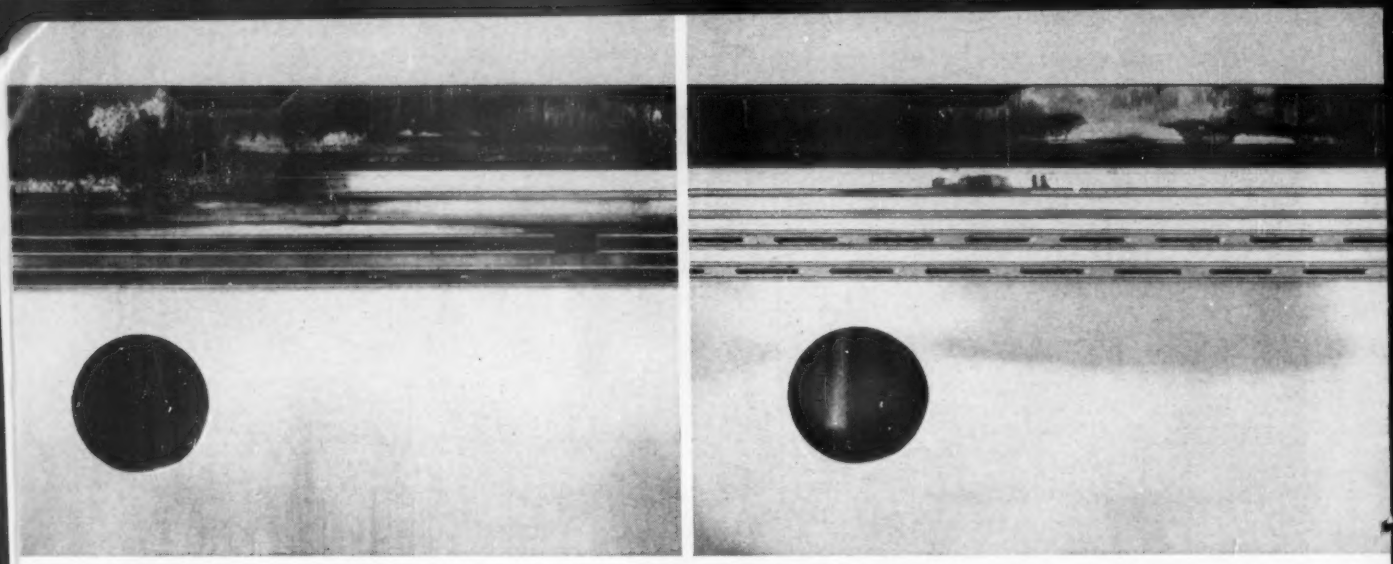

Left: Poor performance of competitive diesel lubricant is easily noted on piston rings.
Right: Superior cleanliness—typical of Shell Rimula Oil performance.

BULLETIN:

Shell reveals how Rimula Oil saved a road construction company $37 per diesel engine on each drain period

A leading road construction company tested Rimula® Oil on a freeway job.

Object: to find an oil that would overcome two key problems in its heavy-duty diesel operations.

1. Heavy engine deposits. 2. Short oil drains.

Read how Shell Rimula Oil tackled these problems, kept the project moving at high speed—and helped to cut overhead.

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The company's lube foreman reports these cost-cutting results:

1. Improved engine performance. Shell Rimula Oil greatly reduced lacquer and valve deposits.

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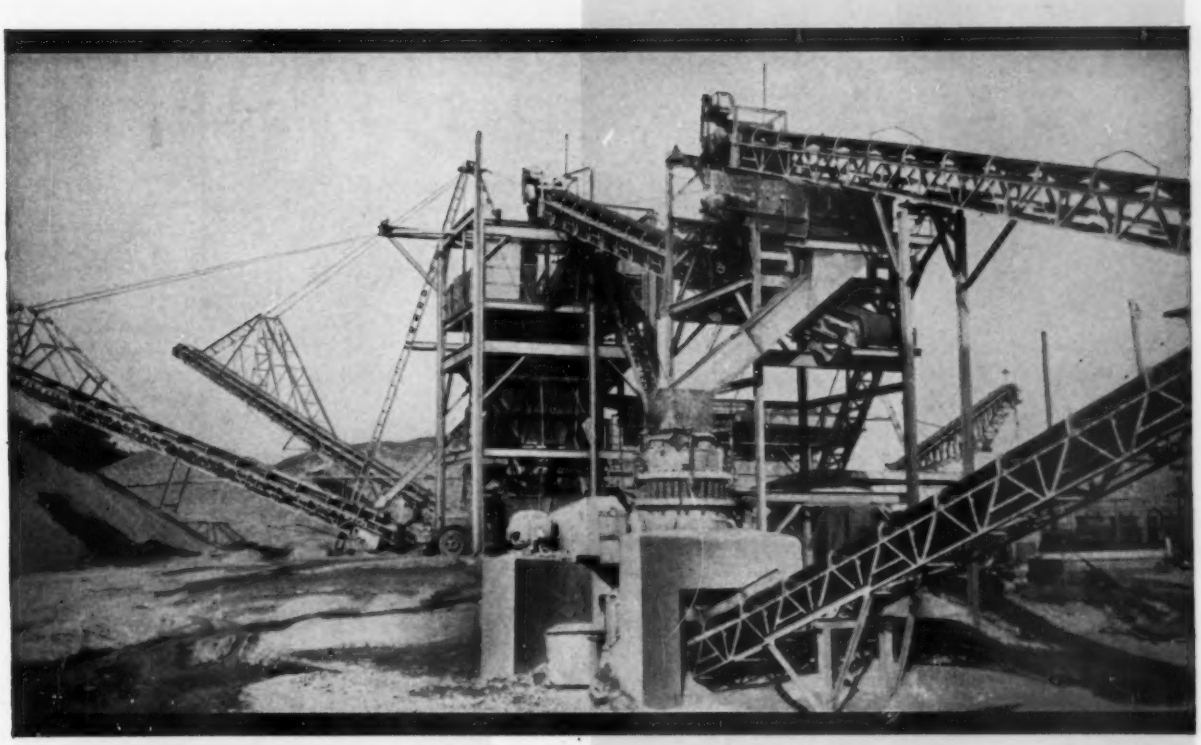

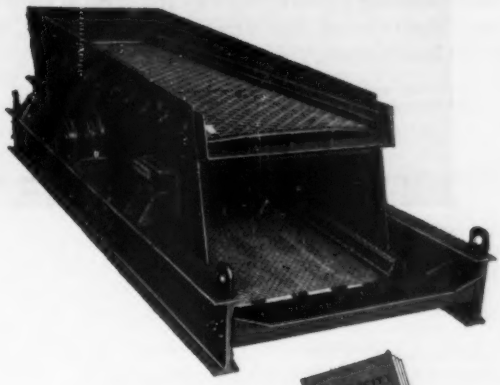

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Washington News Letter

By S. HERBERT UNTERBERGER

THE business community has looked the President's tax gift horse in the mouth and has decided to reject the gift. This has left the Administration, particularly the Treasury officials who had devised what they thought was a highly ingenious scheme for accomplishing a number of objectives at once, in a state of complete bewilderment.

Some weeks ago President Kennedy proposed a program for giving special tax benefits to corporations and other businesses which would increase their investment in new plant and equipment. While the program was not worked out in complete detail, generally it would have allowed a tax credit of 15 percent on investments over and above present depreciation allowances. This allowance was to provide a strong incentive toward immediate and extensive investment. Also, it would have permitted a 6 percent credit on investments over and above one-half of the regular depreciation allowances. That credit was to provide an incentive for reinvesting funds laid aside in depreciation reserves on a current basis. Finally, it would have allowed any firm to take 10 percent of the first $5,000 of any new investment as a tax credit if it had no other credits. This arrangement was specifically designed to benefit small businesses making only a small or single new investment in a year.

This tax benefit proposal, essentially, was the Kennedy reply, drafted principally by Stanley Surrey, Assistant Secretary of the Treasury, to businessmen who have been clamoring for years for accelerated depreciation programs. They stated that such relief was necessary, not only to encourage increased capital investment, but also to achieve tax equity; they declared that in a situation where gradual inflation is expected, it is more equitable to permit a larger part of the depreciation to be taken in dollars of approximately the same value as those used to purchase the plant and equipment.

It is no secret that the Kennedy Administration, like its predecessors, regarded straight accelerated depreciation as nothing more than a tax cut without any expectation of a commensurate expansion in investment. Furthermore, to be large enough to be meaningful, such depreciation would have involved reductions in revenue in excess of 3 billion dollars.

On the other hand, it was estimated that the Kennedy proposal would involve revenue reduction of less than 2 billion dollars. However, if the businessmen responded to that extent, it was expected that the direct stimulation to investment would be extraordinarily great. It was believed that just building the new plant and equipment thus stimulated would provide a half million additional jobs.

It has surprised the Administration officials, plus a large number of other people in Washington, that the business community's first reaction to this first proffered tax cut in many years was less than enthusiastic; and now that there has been an opportunity to consider it carefully, the business community has "turned it down cold" virtually unanimously.

Almost immediately the proposal came in for two criticisms. First, its complexity was criticized. The formulas were difficult to understand. They were based on a rate of depreciation which was established for quite different purposes. As a consequence, the application of the formula was likely to yield rather capricious, unexpected, and uneven results.

Second, it was charged that this proposal was designed to benefit growth firms in growth industry which would, in any event, spend more on new plant and equipment than their current depreciation.

These concerns, it was said, were in no need of encouragement; and, indeed, the tax advantages might induce them to overexpand. On the other hand, stable or declining firms in stable or declining industries would get the smallest advantages and, hence, the smallest encouragement, although they might desperately need new plants and equipment just to survive.

During the intervening period these feelings have become more intense, rather than more moderate. In recent hearings on the proposal, not a single businessman came out in favor of it, not even representatives of the growth industries who would be expected to make most of the immediate gains.

At the same time, a long parade of industry witnesses appeared to oppose it. They ranged from representatives of the relatively moderate (slightly New Dealish) Committee for Economic Development to those with a record of advocating the more traditional industry viewpoints, such as the Machinery and Allied Products Institute and the U. S. Chamber of Commerce. Individual businessmen, as well, testified in opposition to something which is dearest to their hearts, a tax cut.

Fundamentally, the industry position continues to be that the approach along the lines of a tax credit should be a simple across-the-board credit which would be the same for every business. And if a special incentive to increased investment is desired, it should take the form of increased depreciation allowances in

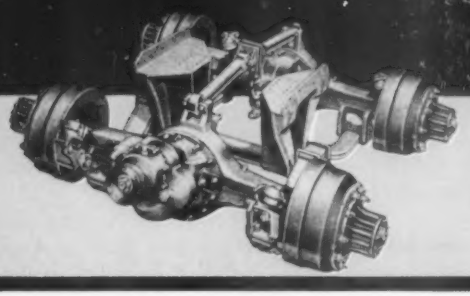
(*Concluded on page 70*)

there's a ROCKWELL-STANDARD Driving Tandem for every kind of service

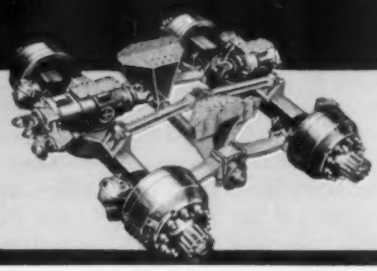
First developed by Rockwell in 1918, driving tandems offer four important advantages over single driving axles... *greater legal payload... greater traction... better flotation... smoother riding!*

Today, only Rockwell-Standard offers a complete line of driving tandem axles to meet every on-or-off highway need. Capacities are available in a range from 22,000 to 150,000 pounds—with axle ratio selection exceeding anything offered elsewhere in the industry.

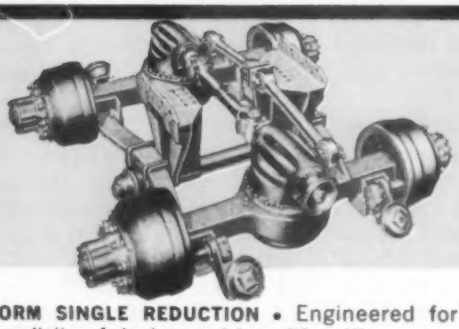
One of the four types of driving tandems below is ideally suited for your particular requirements:



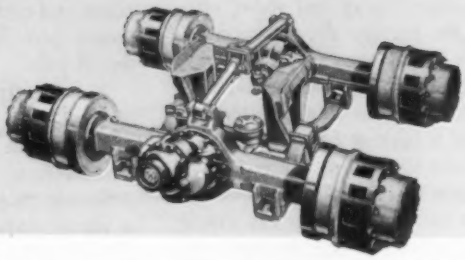
HYPOID SINGLE REDUCTION • Engineered for minimum weight and cost • Husky hypoid gearing for maximum gear strength • Axle ratios up to 8.6 to 1 • Nine models with capacities to 46,000 pounds.



HYPOID-HELICAL DOUBLE REDUCTION • Engineered for universal heavy-duty operations • Balanced hypoid-helical double reduction gearing • Wide selection of ratios • Six models with capacities up to 65,000 pounds.



WORM SINGLE REDUCTION • Engineered for simplicity of design and long life • Worm gear may be reversed to increase operating life • Four models with capacities up to 50,000 pounds.



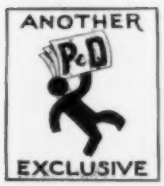
FULL PLANETARY DOUBLE REDUCTION • Engineered for extra heavy-duty operations • Planetary reduction is at wheel end for greatest mechanical advantage • Capacities up to 150,000 pounds.

Products of... **ROCKWELL-STANDARD CORPORATION**

ROCKWELL R STANDARD

Transmission and Axle Division, Detroit 32, Michigan

Labor Developments



THE recent development of the Federal Government's program for handling labor disputes involving construction workers at missile and space sites involves both a horror story and an example of a new constructive approach to labor relations in a very critical area.

The horror story, of course, was that revealed in a series of hearings before the Senate Permanent Committee on Investigations, chaired by Senator John McClellan. In summarizing the Committee's findings, Senator McClellan told the Senate that wildcat strikes, jurisdictional disputes, and work stoppages at Intercontinental Ballistic Missile sites and test centers have cost this country a loss of more than 162,000 man-days of labor. While some of this time was recouped by the payment of exorbitant overtime wages, much of it has been lost forever. He stated, "Many of the work stoppages were deliberately called to create the need for overtime work."

On the question of overtime, he cited some extreme examples, such as the electrician who made $748 one week, the pipefitters who made $365 in a week, and the foreman of common laborers who made $434 in one week, "just $1 more than the pay of the Secretary of the Air Force."

Similar horrible examples were cited with respect to jurisdictional make-work projects whereby some work was done twice by members of different unions; other work was paid for twice although done only once. Senator McClellan also suggested that the government may have been bilked by the imposition of higher wages on missile sites than the prevailing rates on off-site work.

While much of the blame was placed upon the labor leaders, it was not all placed there. The responsibility was attributed partly to indecision on the part of the Air Force and to mistakes made by management. In this connection, Senator McClellan said:

"There is reason to believe that in some instances sub-contractors tolerated, acquiesced in, and encouraged slowdowns by the workers, where management also profited by the delays and excessive costs that were incurred.

"The military services likewise must share the blame. Their attitude in these situations has been far too passive and ineffective. They failed to take aggressive and affirmative action to curb these abuses."

Senator McClellan suspended these hearings before their scheduled completion because President Kennedy and Secretary of Labor Goldberg were getting ready to take action. What that action was makes an interesting story.

Immediately thereafter, the Secretary of Labor met with the representatives of labor, the companies, and the government agencies involved. Out of that meeting came a statement that management and labor had pledged their support to the President's effort to assure uninterrupted and economical work at missile sites. Essentially, this was a no-strike, no-lockout pledge similar to the one given by management and labor early in World War II. But, like that pledge, it was contingent upon the establishment by the government of an agency to see to it that the causes of disputes which do arise can be quickly and fairly adjusted.

By S. HERBERT UNTERBERGER

S. Herbert Unterberger and Company
Economists-Consultants on Labor and Industrial Relations
Washington, D.C.-Philadelphia, Pa.

As usual, a commission was established. Rather than an entirely independent agency, such as the War Labor Board in World War II, it was set up with the Secretary of Labor as chairman and the director of the Federal Mediation and Conciliation Service, William Simkin, as vice-chairman. In addition, it has three members representing the public, three drawn from labor, and three from management.

Unlike the W.L.B., this commission does not, itself, have authority to settle disputes. Instead, it is charged with the responsibility for establishing, at each missile or space site, a labor relations committee composed of representatives of manufacturers, construction concerns, labor organizations, contracting agencies, and a mediator assigned by the Federal Mediation and Conciliation Service.

The primary function of such committees will be "to anticipate impending problems and to arrange for proper disposition of them prior to the time that such problems become acute, utilizing fully all voluntary settlement procedures already in existence and encouraging establishment of adequate grievances and jurisdictional procedures where such procedures do not now exist, to the end of preventing any interruptions of effieient performance of work."

This commission will establish procedures whereby it will be advised of any labor relations problems which cannot be settled by such voluntary procedures. It is authorized to establish such procedures as appear to it to be necessary to produce a satisfactory settlement. Among these, it may establish special panels to hold hearings, to make findings of fact, to make recommendations for settlement, to obtain agreement for final binding arbitration, to mediate such disputes,

(*Concluded on page 76*)

HANDLING COSTS GO DOWN

WITH PNEUMATIC BULK SYSTEMS

Shown above is a Bulk Cement distribution facility for rail and/or truck loading and unloading, engineered, designed and constructed by Halliburton.

Halliburton Pneumatic Trailer with two 350 cu. ft. tanks.

Air Troughs, open or closed type, with pneumatic control gates operated from remote locations.

Halliburton engineered pneumatic "Floating Warehouse" bulk material barge facility — 8,750 bbl. bulk cement load capacity.

If it's dry . . . if it's bulk
if it's here and you want it there . . . Halliburton Pneumatic Bulk Handling Systems can move it faster and cleaner than any mechanical conveyor.

Halliburton Pneumatic Systems operate on the proven simplicity of low air pressure. With them, you can convey most any powdered — and many granular materials *anywhere you can run a pipe.*

In addition to in-plant handling systems, Halliburton can provide Pneumatic equipment for bulk materials handling by any conveyance — road, rail, or marine.

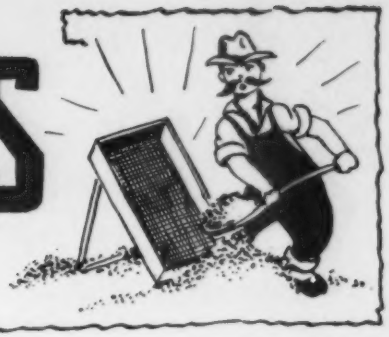
Call for a visit from a Halliburton man. He can help you lower the cost of handling dry bulk materials *. . . pneumatically!*

Over 35 years experience
of handling more than
500,000,000 cu. ft. of materials

SPECIAL PRODUCTS DIVISION

Halliburton
COMPANY . DUNCAN, OKLAHOMA

SCREENINGS



By RAY L. SMITH JR.

LEARNING to do things better and improving one's lot is an all-American pastime.

But, alas, a terrible plan is afoot.

This dastardly act about to be committed isn't of the magnitude of promoting Communism or pushing old ladies down two flights of stairs, but it could change many lives.

A famous French chef has been commissioned to improve upon the American hot dog. Manufacturers—for some oddball reason—feel the wiener needs to raise its status.

How one is to set about improving upon perfection is beyond comprehension.

Hot dogs, either boiled, fried or limp right out of the package, were designed to fit long rolls and to be smothered with things like mustard, mayonnaise, relish, catsup or anything else that suits the consumer's whims of the moment.

The frankfurter institute hopes to change the hot dog from a filler to a gourmet food.

It would, we presume, be used to garnish eggs at breakfast, be substituted for beef in stew, and like that.

Imagine one's surprise to find braised hot dogs on the menu of a fancy eatery. For $5 this tasty dish would be served on toast points, either rare, medium or well done and garnished with a fine wine sauce.

To compound the felony, it has been suggested the shape of the hot dog be changed to round instead of oblong.

It's now or never, coveters of the hot dog.

Rise up and be counted.

* * *

Coffee drinkers were dry-gulched several years ago with the introduction of the instant bean.

Many a person has since sworn off and for good reason.

The pungent early morning smell of old has been reduced to a kettle of boiling water.

Now, there appears on the horizon the final desecration of yet another brew.

Quaffers of beer will soon be able to purchase packaged courage in a tiny envelope.

A fellow will be able to carry an entire case of beer right in his shirt pocket. A little tap water puts him in business.

A bartender would be taking a terrible risk in just serving a glass of water to a minor. He might even demand some proof of age.

Beer manufacturers will probably soon be advertising thusly: "Crisp and light and easy to fix, get that good Milwaukee mix."

Practical jokers would have all sorts of fun spiking fish bowls and the office water cooler.

Next to come will probably be instant cocktail mixes with a second envelope for instant cherries, olives or onions.

Now if some bright soul comes up with an instant hangover cure, the late-riser who views the world through rose colored eyeballs will be forever grateful.

Potpourri and Succotash

A small-town druggist was down but far from out. Closed by the sheriff he posted this notice in the window:

"Our doors are locked. The following services, formerly available here, may be had as follows: Ice water at the fountain in the park. General information from the policeman at the corner. Change for a dollar at the bank. Matches and scratch pads at the hotel. Rest rooms at home. Magazines for browsing at the doctor's office. Bus information at the terminal. Loafing at any other location of your own choosing."

A woman stopped at the office of an exclusive plastic surgeon. "How much would you charge for altering my nose?" she asked.

"A thousand dollars," said the doctor.

"Why, that's an outrage!" she exploded. "Isn't there something less expensive?"

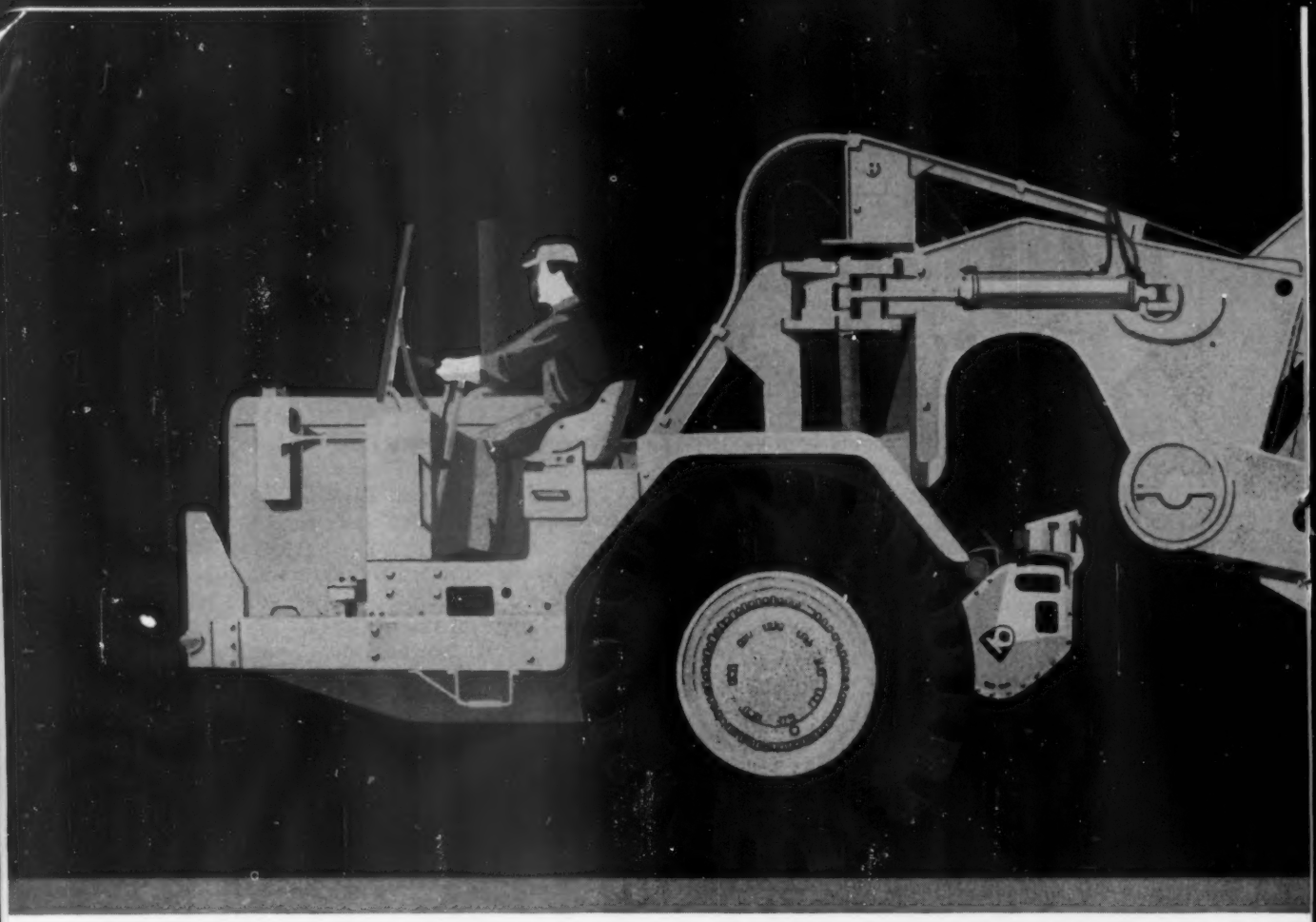
"Madam," said the surgeon sweetly as he rose to open the door for her, "you might try walking into a lamp post."

There is a report going round that on a door in a government building in Washington there is a sign that reads:

7167
General Services Administration
Region 5
Public Building Service
Building Management Division
Utility Room
Custodial

Translation—Broom Closet

The Army cook had just whipped up orders of fried eggs for a hungry mob of soldiers. Wearied by his labors, he sat down and rested a bit, then wrote to his sweetheart: "Darling," he began, "for the past three hours shells have been bursting all around me."



NEW, IMPROVED CAT 619...SERIES C...ALL NEW 4-CYLINDER ENGINE... 24% MORE HORSEPOWER...COMPACT...ECONOMICAL...CHOICE OF POWER SHIFT TRANSMISSION, DIRECT DRIVE...COMPLETE UNIT CONSTRUCTION...EASY SERVICING...NEW TIRE SIZE...AIR ACTUATED, LIVE POWER CABLE CONTROL...IMPROVED 18 YD. (14 YD. STRUCK) SCRAPER.

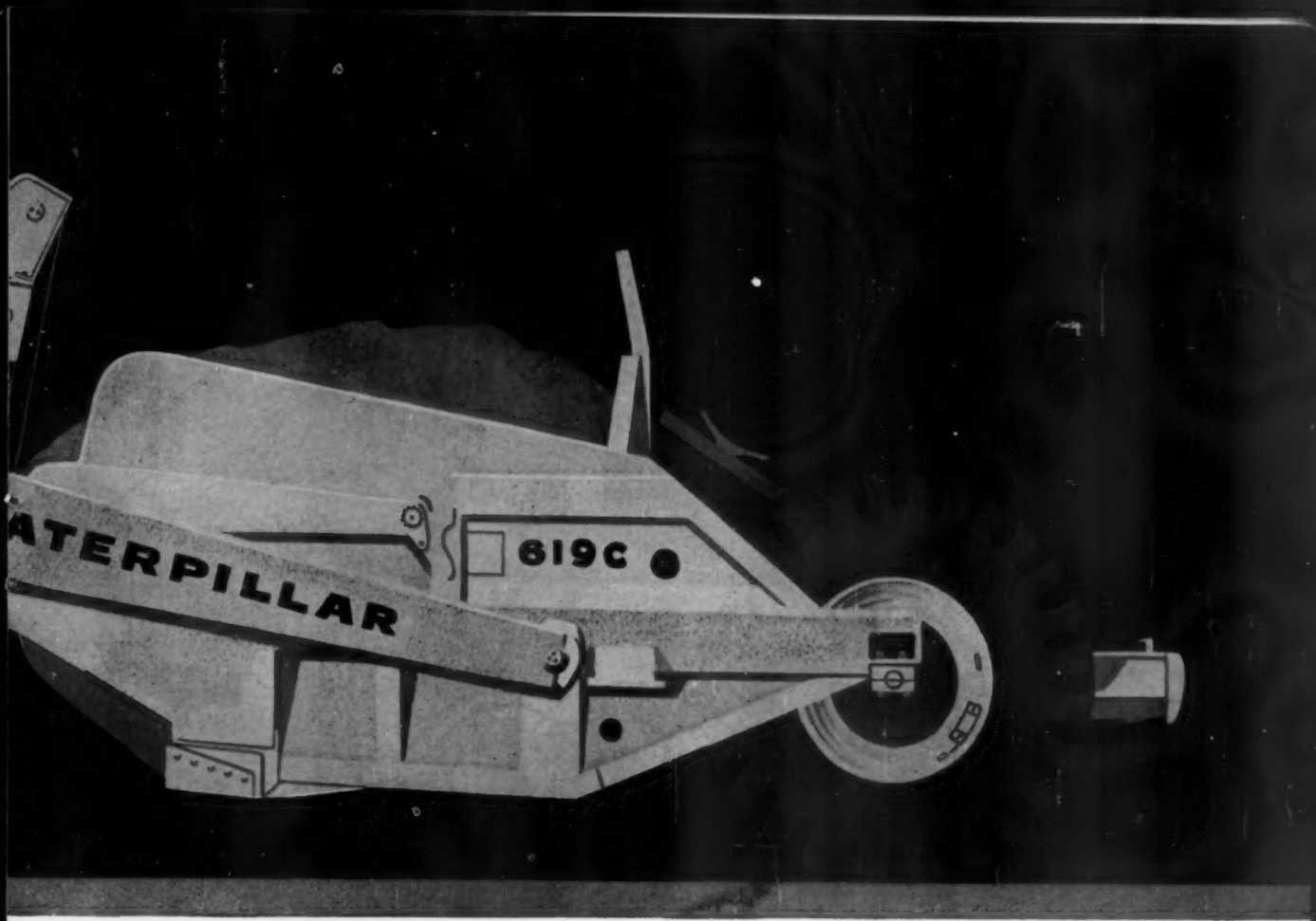
Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

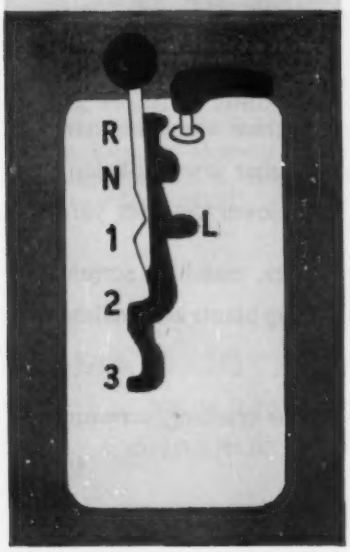
CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

ADVANCED AS TOMORROW —CERTAIN AS YESTERDAY

Enter 16 on card, page 241

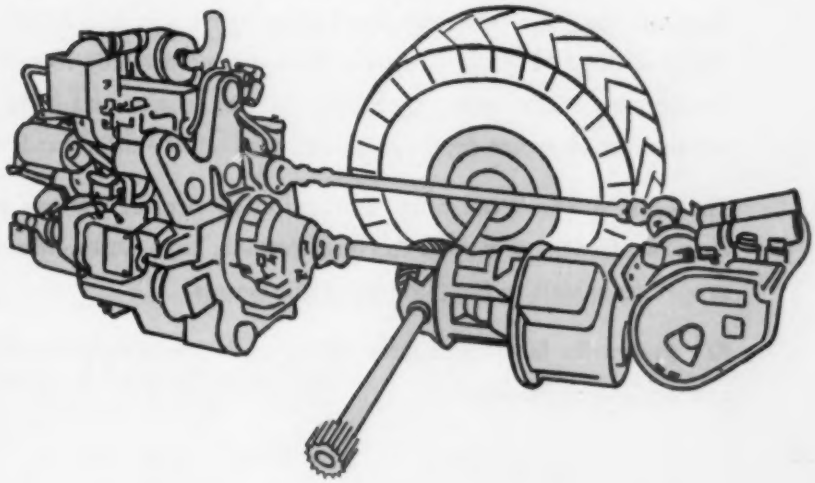




New 280 HP 619C offers choice of power shift transmission for faster, easier operation or direct drive transmission. Air actuated, live power cable control reduces operator effort. New, bigger 26.5 x 29 (22 ply) tires improve roadability. Top speed: 30 MPH. Capacity of matching Lowbowl scraper: 18 cu. yd. heaped, 14 cu. yd. struck. Also available: 25 ton PR619 Rear Dump Trailer built by Athey Products Corp.

New power shift transmission provides 9 speeds forward with just 3 shifts. One lever gives operator instant selection of 3 speed ranges . . . dial indicator tells him **when** to shift. Within each speed range, transmission **automatically** shifts to torque divider drive, direct drive or overdrive to match job conditions. The 619C with power shift transmission always operates at the right speed and power for the job at hand.

New, more powerful Cat D340 Engine (280 HP maximum, 250 HP flywheel at 1900 RPM). This economical 4-cylinder engine burns No. 2 fuel oil . . . has parallel-ported dual intake and exhaust valves and overhead camshafts for most efficient operation . . . has pressure ratio controlled turbocharger and aftercooler. Swingaway dash and pivoted crankcase guard simplify servicing. Unit construction assures easy servicing: engine, transmission, planetary final drives can be removed without disturbing adjacent components.



THE USEFULNESS OF A **LIMA AUSTIN-WESTERN**

MORE ROCK FOR LESS MONEY . . .

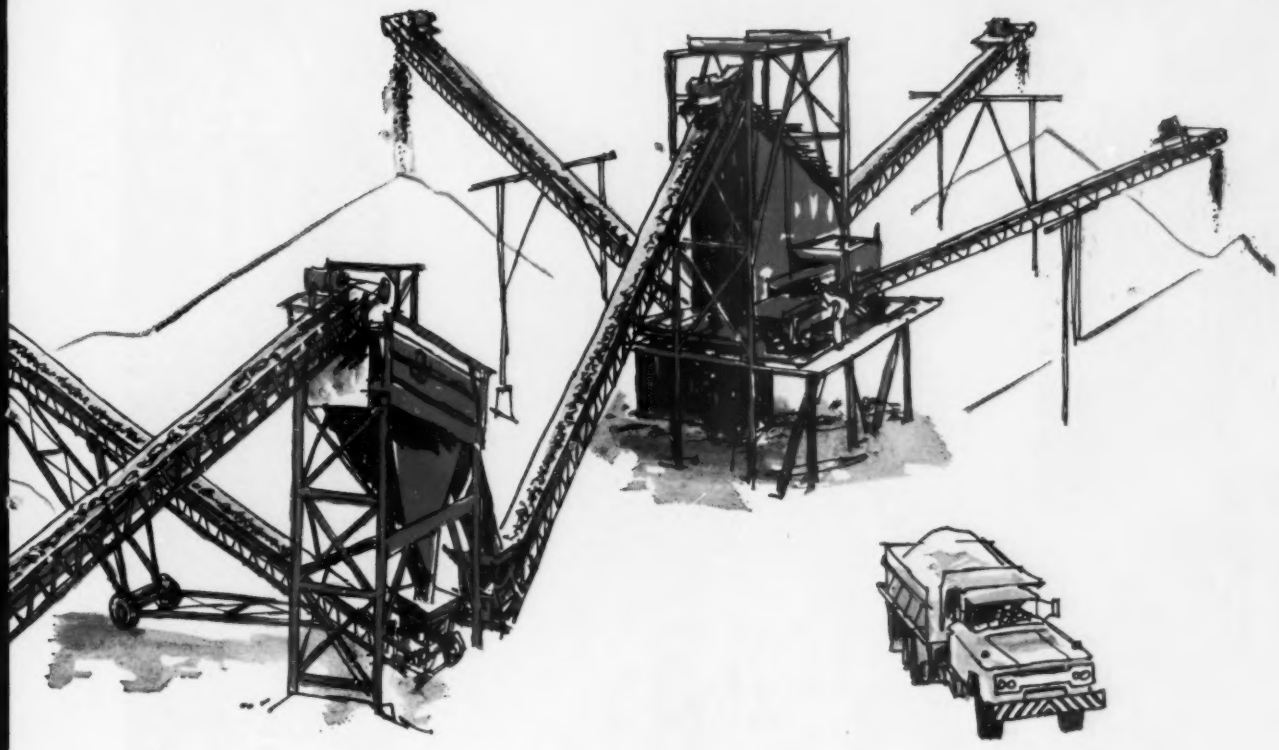
More for less, of anything, is a rarity today. But you can get it with a Lima Austin-Western stationary crushing installation like this, because it is a high-speed, big-output operation from start to finish. It can be custom engineered for a specific operation—*such as yours!*

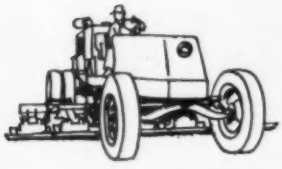
High performance is possible because only the finest materials are used—such as antifriction roller bearings and many special-strength alloy steels scientifically checked for structural perfection. Years of manufacturing experience have produced highly refined designs which eliminate many troublesome shafts, gears, sprockets, clutches, chains and belts. Deep crusher jaws with long, smooth stroke assure dependably high production—more yards per hour, lower cost per yard.

The Lima Austin-Western line includes many sizes of jaw and roll crushers, matching screens, elevators, feeders, conveyors and bins. Portable Lima Austin-Western crushing plants are available in various models to fit your exact requirements.

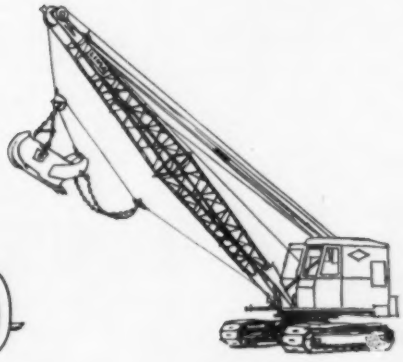
Ask us now for facts and figures on the profit-producing performance of our crushing, screening and washing equipment.

6125

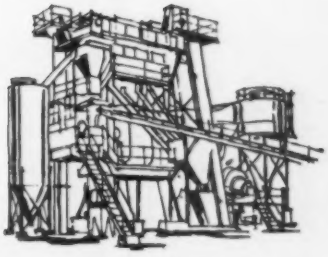




LIMA MODEL D ROADPACKER
—Six vibrating shoes compact fast and deep for profitable single-course construction; available in 12-shoe Super model.



LIMA SHOVELS AND CRANES
—Interchangeable front ends. Shovels to 8 yd.; cranes to 140 tons on crawlers, 80 tons on rubber; draglines variable.

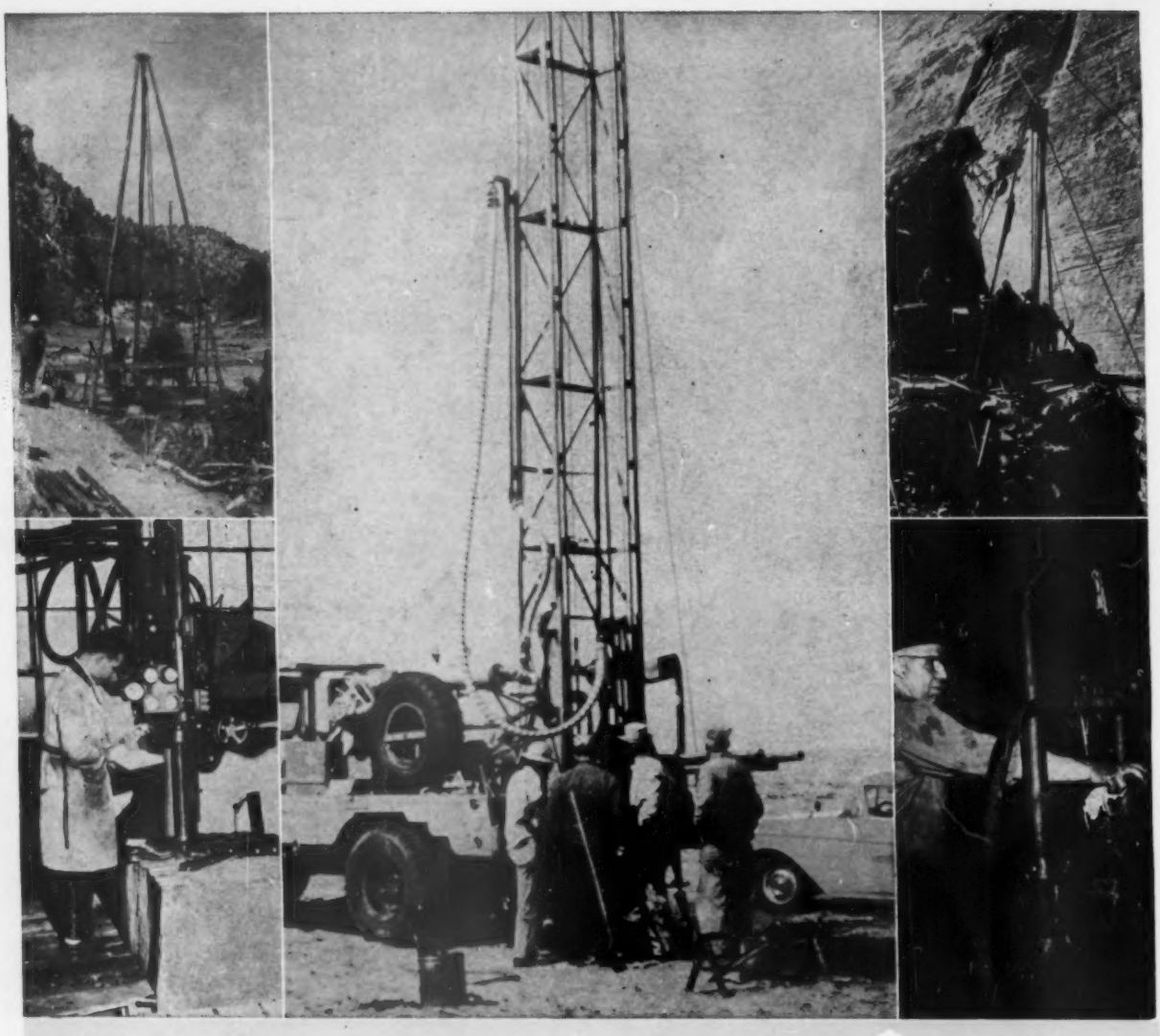


LIMA MADSEN ASPHALT PLANTS
—available in models with batching capacities from 1000 to 10,000 lb.

LIMA AUSTIN-WESTERN Crushing, Screening and Washing Equipment

BALDWIN · LIMA · HAMILTON

CONSTRUCTION EQUIPMENT DIVISION · LIMA, OHIO



Operate at "Less cost per foot" . . .

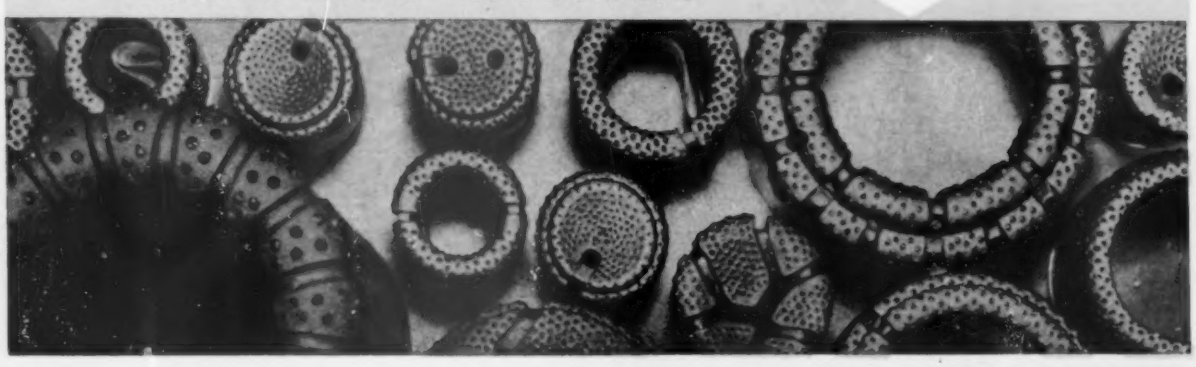
. . . with Christensen diamond bits and core barrels "engineered" for your particular drilling problem. Experienced field consultants are available regardless of your job location or scope of operations.

"Less cost per foot"

CHRISTENSEN DIAMOND PRODUCTS

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
SALT LAKE CITY, UTAH

SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS



Dayco CORPORATION

Dayton Industrial Products Co. Div. Melrose Park, Illinois

PROBLEM:

A highway job -- where air hose attached to an Ingersoll-Rand Crawlmaster Drill is dragged over rough terrain covered with sharp rock -- hose has to be "more than ordinary" to stand such abuse.

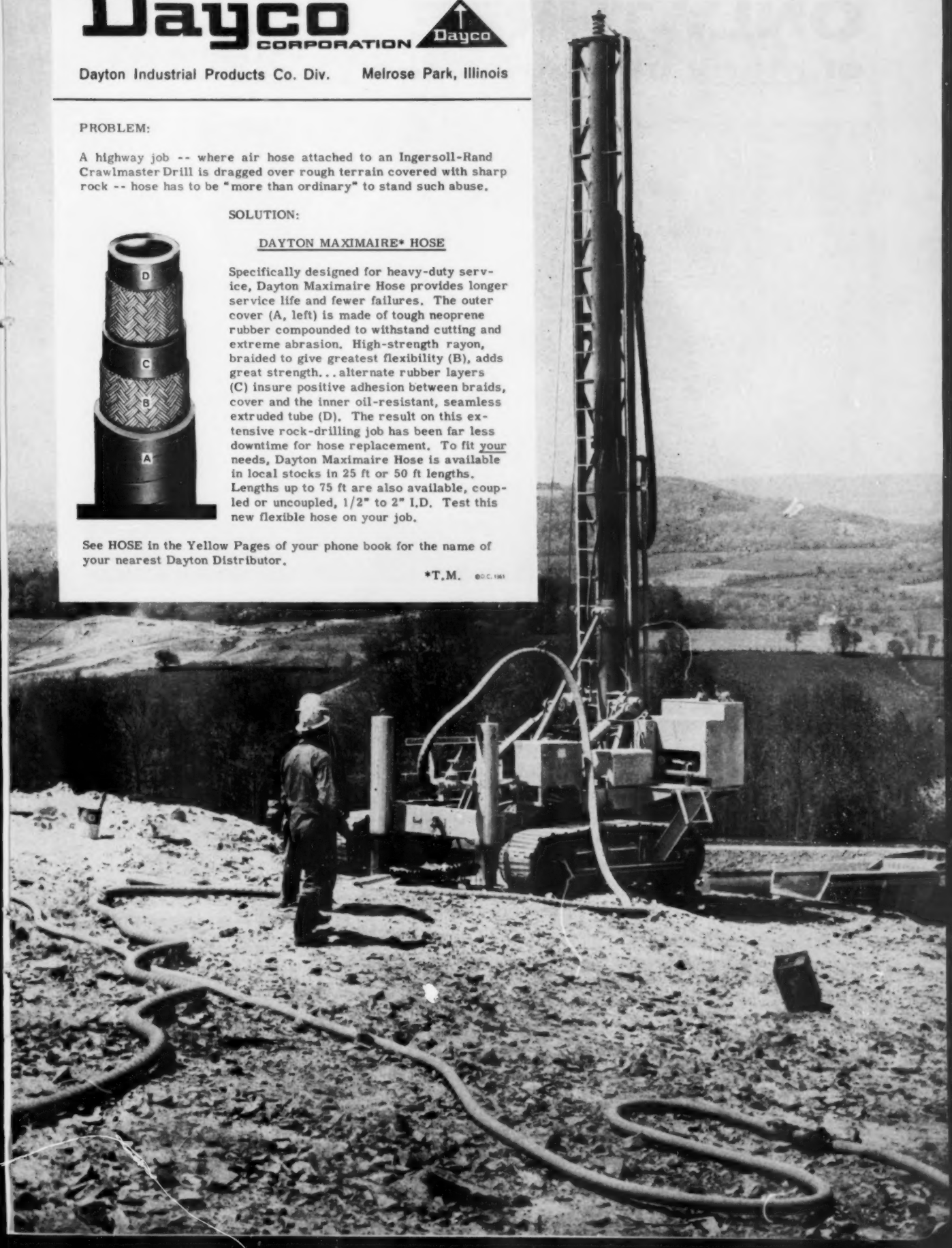
SOLUTION:

DAYTON MAXIMAIRE* HOSE

Specifically designed for heavy-duty service, Dayton Maximaire Hose provides longer service life and fewer failures. The outer cover (A, left) is made of tough neoprene rubber compounded to withstand cutting and extreme abrasion. High-strength rayon, braided to give greatest flexibility (B), adds great strength...alternate rubber layers (C) insure positive adhesion between braids, cover and the inner oil-resistant, seamless extruded tube (D). The result on this extensive rock-drilling job has been far less downtime for hose replacement. To fit your needs, Dayton Maximaire Hose is available in local stocks in 25 ft or 50 ft lengths. Lengths up to 75 ft are also available, coupled or uncoupled, 1/2" to 2" I.D. Test this new flexible hose on your job.

See HOSE in the Yellow Pages of your phone book for the name of your nearest Dayton Distributor.

*T.M. ©D.C. 1961



ONLY THREE
of many combinations

Moline Buckets and Chains

TAKE ADVANTAGE of Moline's wide selection of buckets and chains. Apply exactly the right combination of bucket and chain to meet the specific conditions of your elevating job and matched to your service load requirements.

Moline "matched-to-service" buckets and chains can replace costly specials and provide extra long service life.

Moline Buckets, made with reinforced corners and uniformly thick walls, are stronger than steel buckets of equal gauge. Six models are available in either Malleable or Promal. Chains include Combination, Detachable, Pintle, H-type and Ley Bushed. Buckets may be ordered either plain or punched for chain or belt mounting.

Call your local authorized Moline distributor today! He will be glad to recommend several efficient chain-bucket combinations to suit your purpose—and to give you comparative costs and service estimates.

Moline Chains

Moline Malleable Iron Company
St. Charles, Illinois

CAST "AC" BUCKETS
Designed for cement, lime and other dry, powdery materials. High fronts provide extra load capacity. Hooded backs reinforce buckets and permit closer spacing. Extra thickness of metal at wear points gives extra long service. Four sizes available . . . plain or punched for chain attachments.

"CONTINUOUS OPERATION" BUCKETS for elevating stone, gravel or coal provide large capacity at slow speed. Flanges on the bottom form a chute for material discharged from the following bucket. Available in Malleable or Promal.

News of the Industry

A-M Merger with Martin Recommended to 2 Boards For Official Approval

The boards of directors of American-Marietta Company and the Martin Company have announced that plans are under way for the consolidation of the two concerns. Martin is a Baltimore missile and aeronautics component maker.

Under the terms of the present setup, the two companies will exchange one share of the merged firm for each share of American-Marietta held and 1.3 shares of the new firm for each share of Martin. A-M Class B common stock will be eliminated, and holders will be given preferred stock in the consolidated company. The merger plan is subject to the approval of the shareholders of both concerns.

It was indicated that under the merger plan George M. Bunker, chairman of Martin Company, would be chairman of the board of the new firm, and Grover M. Hermann, A-M chairman, would be vice-chairman. Robert E. Pflaumer would continue as president of the Marietta division, and William B. Bergen would succeed Mr. Bunker as president of the Martin division.

Sales of the combined companies would be more than $1 billion annually. Marietta's 1960 sales amounted to $368,000,000, and net earnings were $24,400,000. Net income for the three months ended May 31, 1961, rose to $5,485,970, from $5,401,805 in the comparable period in 1960. For the 6-month period ended May 31, sales were $157,230,234 (net income, $6,318,-854), compared to $160,915,599 for the same period in 1960 (net income, $8,961,736).

Missouri Portland Plant Scheduled at Joppa, Ill.—Capacity, 3,000,000 Bbl.

Construction will start this summer near Joppa, Ill., on a 3,000,-000-bbl. cement plant for the Missouri Portland Cement Company. Cost of the new operation will be $20,000,000.

Completion is expected in two years. Substantial deposits of limestone in the Cave-in-Rock area have been acquired by the firm. Both raw materials and finished cement will be shipped by water.

The Joppa plant, to be built on a site near the Ohio River, will feature a 550-ft. kiln, and will have its own dock facilities. It is estimated that between 300 and 350 men will be employed. With this new operation, the firm's over-all capacity will be upped to 11,000,000.

Coming Events

July 13-14, 1961—White Sulphur Springs, W. Va. Midyear meeting, National Crushed Stone Association board of directors. The Greenbrier.

July 20-21, 1961—Allentown, Pa. Midyear meeting, The Expanded Clay and Shale Association. Americus Hotel.

July 23-26, 1961 — French Lick, Ind. Midyear meeting, National Bituminous Concrete Association. French Lick-Sheraton Hotel.

August 10-12, 1961 — Chicago. National Sand and Gravel Association Controllers' Conference. The Edgewater Beach Hotel.

August 20-24, 1961—White Sulphur Springs, W. Va. Semi-annual meeting, National Sand and Gravel Association board of directors. The Greenbrier.

September 11-13, 1961—Seattle. American Mining Congress, Metal Mining and Industrial Minerals Convention.

October 2-3, 1961—Ottawa, Ont. Joint meeting, Industrial Minerals Divisions, Canadian Institute of Mining and Metallurgy and Society of Mining Engineers, American Institute of Mining, Metallurgical and Petroleum Engineers. Chateau Laurier.

October 4 and 5, 1961—Pocono Manor, Pa. Annual meeting, National Slag Association. Pocono Manor Inn.

October 5-6, 1961—Washington, D.C. Operators meeting, National Lime Association. Shoreham Hotel.

October 16-20, 1961—Chicago. Safety Congress, National Safety Council. Hilton, Pick-Congress, LaSalle, Sheraton-Chicago hotels.

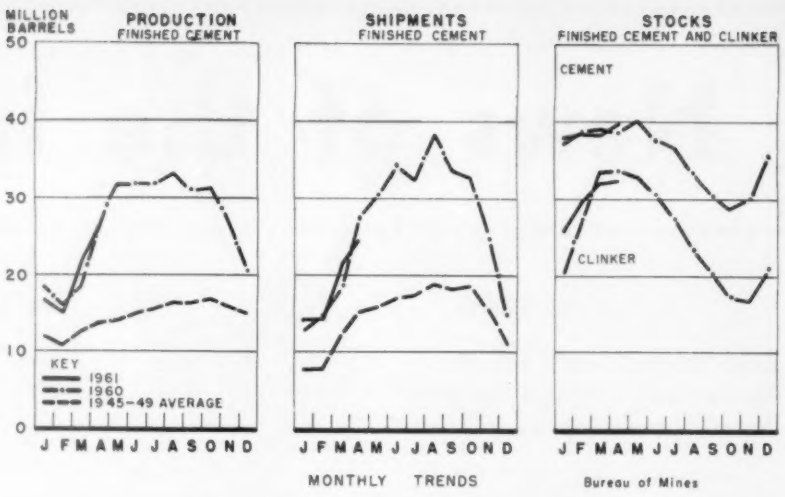
Construction Put in Place Above Year-Ago Rate During Month of May

The value of new construction put in place in May, 1961, amounted to $4.8 billion, according to preliminary estimates of the U. S. Department of Commerce. This amount was 11 percent more than in April (compared to a normal seasonal increase of 9 percent between the two months), and 3 percent above the level in May, 1960.

Cumulative value for new construction expenditures in the first five months of 1961 was estimated at $20.4 billion, compared to $20.1 billion in the same period last year. While total private construction declined 3 percent to $14.4 billion, and private residential slipped 8 percent to $7.7 billion, total public construceion increased 12 percent to $6.0 billion.

ITEMS: Private construction, estimated at $3.3 billion, was 9 percent greater than in April (compared to a normal seasonal increase of 7 percent between the two months), and 1 percent above May, 1960. Residential was estimated at $1.8 billion—10 percent more than in April, but 2 percent under May, 1960.

ITEM: Public construction, estimated at $1.5 billion, increased more than the normal seasonal change from April. It was up 18 percent (the usual increase is 13 percent), and was also 7 percent above May, 1960.



— April, 1961, Finished Portland Cement —

SUMMARY—Production of finished portland cement in April, 1961, as reported to the U. S. Bureau of Mines, totaled 26,463,000 barrels—a decrease of 2 percent compared with April, 1960. Mill shipments totaled 24,531,000 barrels—a decrease of 10 percent compared with April, 1960. Stocks of 39,948,000 barrels of finished portland cement were 4 percent more than those on hand April 30, 1960. Clinker production totaled 26,812,000 barrels—a decrease of 1 percent compared with April, 1960. A new cement plant was in operation at Tulsa, Okla.

►PRODUCTION—A total of 166 plants in 39 states and Puerto Rico reported production of 26,463,000 barrels in April, 1961, compared with 27,015,000 barrels in April, 1960.

Clinker production totaled 26,812,000 barrels, compared with 27,165,000 barrels in April, 1960.

High-early-strength portland cement totaled 1,213,000 barrels—an increase of 8 percent from the April, 1960, production of 1,120,000 barrels.

Prepared masonry cement production of 1,829,000 barrels, decreased 9 percent from the 2,003,000 barrels in April, 1960. Masonry cements are reported in 280-lb. barrels.

►SHIPMENTS—Mill shiments of finished portland cement from 176 plants totaled 24,531,000 barrels, compared with 27,341,000 barrels in April, 1960.

Shipments were higher in 6 districts and lower in 19 districts. Increases were greatest in two districts: Minnesota, South Dakota, and Nebraska; and Colorado, Arizona, Utah, and New Mexico.

Shipments of high-early-strength cement totaled 1,172,000 barrels—a decrease of 8 percent from 1,269,000 barrels shipped in April, 1960.

Shipments of prepared masonry cement totaled 1,621,000 barrels—a decrease of 20 percent from 2,012,000 barrels shipped in April, 1960.

►STOCKS—Mill stocks of 39,948,000 barrels of finished portland cement were on hand April 30, 1961—an increase of 4 percent from 38,554,000 barrels on hand April 30, 1960. Stocks of clinker on hand April 30, 1961, totaled 32,380,000 barrels—a decrease of 4 percent from the 33,616,000 barrels on hand April 30, 1960.

►FIRST FOUR MONTHS OF 1961—For the January-April period, the production volume of finished cement amounted to 80,096,000 bbl., compared with 80,186,000 bbl. in the 1960 four-month period. Total shipments for the first four months of 1961 are reported at 74,940,000 bbl.; in the same period of 1960 total shipments were 72,364,000 bbl. (Shipment figures do not include finished cement used in the manufacture of prepared masonry cement, as follows: April, 1960—297,000 bbl.; January-April, 1960—693,000 bbl; April, 1961—221,000 bbl.; January-April, 1961—709,000 bbl.) ●

Marble Cliff Quarries Co. Backs Road-Building Research

A $40,000 road-building research project is now under way at Ohio State University's Transportation Engineering Center. It is jointly sponsored by the Ohio Department of Highways, The Asphalt Institute, and the Ohio and National Bituminous Concrete Producers associations. This project is concerned with research in every important phase of highway construction, and its eventual findings will be of great importance to the bituminous concrete road-building industry.

Valuable data and information gained during the last four years of research conducted by Marble Cliff and the Ohio Bituminous Concrete Producers Association through Ohio State University has been made available to The National Bituminous Concrete Association program for quality improvement. This program, launched in 1959, will develop research on virtually all phases of bituminous concrete pavement design and construction in a well co-ordinated effort for the benefit of all interested groups and the public.

• Correction

The location of the New Paris Stone and Lime Company, (page 26, June, 1961, PIT AND QUARRY) was given as Bedford County, Ind. This firm is in Bedford County, Pa.

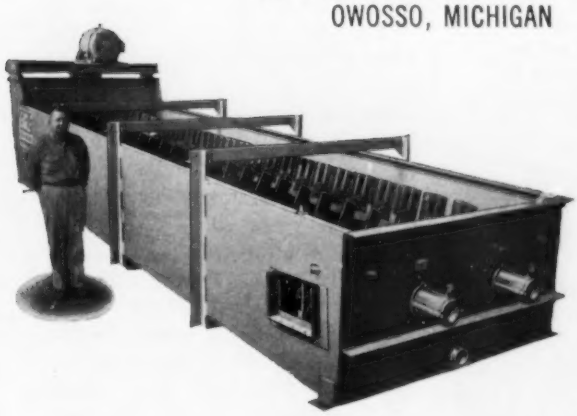
Plans for the construction of a $9,000,000 gypsum products plant will be carried out by the National Gypsum Co. although Tampa has annexed the plant site at Port Tampa, Fla.

Enter 25 on card, page 241 →

"WE GET QUALITY AGGREGATES FOR READY MIX

From our Eagle Sand Washing Section and our Sol-Clay Washer"

-GRAND RIVER GRAVEL CO.
OWOSSO, MICHIGAN



The Eagle Sol-Clay Washer has corrugated paddles of wear resistant Ni-Hard chromium-nickel iron alloy. Paddles are replaceable and are bolted to lugs or spuds on the 10" dia. tubular steel shafts. The Sol-Clay Washer has proved itself for economical removal of soluble clays from gravel.

All aggregates, both fine and coarse, are processed by Eagle Equipment at the modern, efficient plant of Grand River Gravel Co. Much of the processed material goes to the Owosso Ready Mix Co. which is pleased with the excellent products that the Eagle Equipment is turning out. Area contractors are also pleased.

The Eagle Sand Section consists of a 20′ Water Scalping-Classifying Tank with a 3-cell Collecting-Blending Flume and a 36" x 25′ Single Screw Washer-Classifier-Dehydrator. One cell of the flume is set aside for future use, another cell collects and disposes of the excess of certain meshes of sand and the third cell delivers usable material to the screw unit. Supporting structurals and walkways were also designed and fabricated by Eagle.

The Sol-Clay Washer processes the gravel. The corrugated paddles abrade the gravel scrubbing it clean and at the same time break down pieces of soluble clay which go into solution and are floated out of the washer to waste. This type of clay does not require the heavy scrubbing action of the Eagle Log Washer, but is a little too tough for an Eagle Coarse Material Washer to handle—the Sol-Clay Washer fills the gap and does an excellent job.

Eagle builds THE complete line of aggregate washing equipment—for both fine and coarse aggregate. The large number of successful Eagle installations is your guarantee that Eagle Equipment can solve your problem. Send for Catalog.

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WILLIAMS BUCKETS DIG BIG

Construction of the first Minuteman base in the country began in March. The intercontinental ballistic missiles will be stored for instant use in 150 underground silos controlled by 15 launching centers.

It takes a lot of blasting and big digging to put a Minuteman to bed in the solid rock of central Montana. The chore for Williams Buckets is excavating shot rock from missile silos to a depth of 50 feet. It's the kind of job the Williams Bucket is built to do—heavy, steady work with no breakdowns.

Alloy steel construction, welded throughout, gives Williams clamshell and dragline buckets quality tough enough for any job.

The catalog will give you details on buckets for every application.

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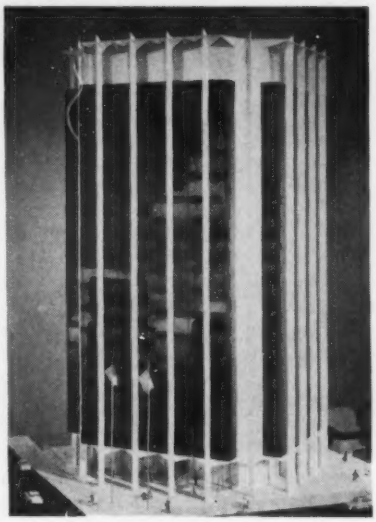
Enter 26 on card, page 241

Skyscraper Office Building Planned for U.S. Gypsum In Downtown Chicago

Spokesmen of the United States Gypsum Company have announced that a 17-story office building cost-



An architect's model showing the diagonal position of the proposed United States Gypsum Company building.

ing approximately $7 million will be built for the firm in Chicago.

The site, at Wacker Drive and Monroe Street, was acquired in 1960 at a cost of about $1.5 million. Only 50 percent of the quarter-block site will be used for the building, which will be set at a 45-degree angle. This position will provide triangular plaza sites at all four corners. The structure will be designed by Perkins & Will, Chicago.

U. S. Gypsum national headquarters offices will occupy about 60 percent of the building on the upper floors, and the lower floors will be rented to other concerns.

At Tulsa, Okla., near the site of the Dewey Portland Cement Company's new plant, a $1.5 million crushed stone plant will be erected for the Tulsa Rock Company. This concern, newly formed, is headed by Jack Schaller, president. The new facility, which will be built on a 550-acre (leased) tract, is expected to have an hourly capacity of 300 tons.

Work on $14 Million Plant Of Calaveras Cement Co. At Redding Nearly Done

Construction is nearing completion at the site of the $14,000,000 cement plant of Calaveras Cement Company (a division of Flintkote Company) near Redding, Calif. Reserves at the plant are considered sufficient for 100 years of operation.

Installation of various units is under way from the plant proper to the quarry, which is 7,000 ft. away and 1,000 ft. above the plant. Limestone will be transported down the mountain from the quarry by conveyor belt at the rate of 300 t.p.h.

Isbell Construction Company, Reno, Nev., is opening the quarry, establishing the benches, and building the 7,000-ft. conveyor route. For the quarry benches, a diesel-powered Marion Type 101-M is employed. This unit will later be used as a regular production machine.

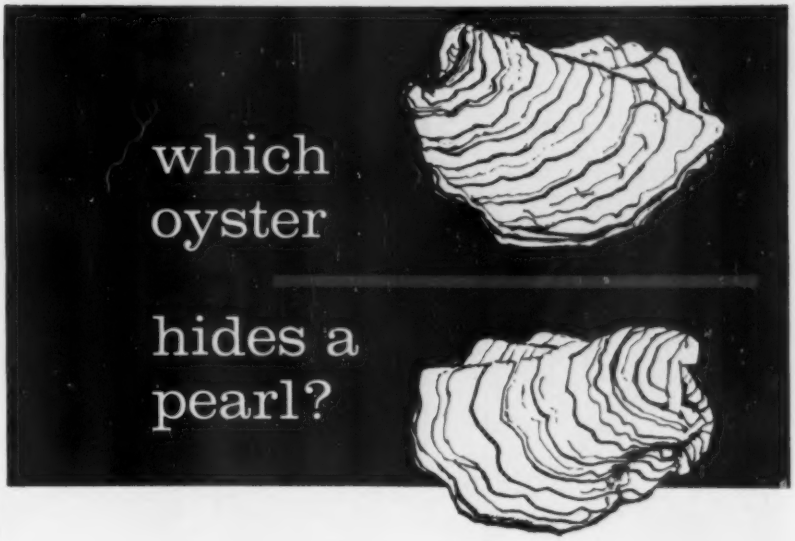
The 1,500,000-bbl. per year plant will have nine silos and one kiln, and will be automatically operated by a crew of 80 men on three full shifts.

Americans Join Canadians In Mining Division Meetings

On October 2 and 3 the Industrial Minerals Division of the Canadian Institute of Mining and Metallurgy and the Society of Mining Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers will hold a joint meeting at the Chateau Laurier in Ottawa, Ont.

In addition to the technical sessions, tours of inspection will be made to plants in the area in which the following materials are processed: asbestos, talc, dolomite, magnesite, brucite, limestone, lime, and nepheline syenite.

A $250,000 headquarters building for Texas Construction Material Company, reportedly the Gulf Coast's oldest and largest sand, gravel, and crushed stone producer, will be built at 3816 West Alabama, Houston.



Each time he sinks to the floor of the sea the pearl diver is filled with hope . . . hope that one of the oysters he will send to the surface hides a priceless pearl.

Oysters and replacement parts for crushers, shovels and tractors have much in common, for there are replacement parts which hide values as priceless as pearls, values which can save thousands of dollars each year. And, as oysters must be opened to determine which will yield the pearl, replacement parts reveal their true qualities only in service.

This is why Columbia invites you to test its Armor-Tough manganese steel replacement parts . . . the best investment for crusher, shovel and tractor. Once you have tried Columbia Armor-Tough parts you will never use any other . . . because Columbia parts will do more work per dollar invested than any other make.

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Enter 27 on card, page 241

H-90B replaces three other machines

"The H-90B will go into the stockpile and get a full load fast, and it's quicker on the dump than other loaders previously used," says Leonard Lewis, Superintendent of A & R Stone Co., Inc., Murfreesboro, Tenn. "Other features of the H-90B that we particularly like are its good all-around performance, the best of traction and load-carry balance, offering maximum operator safety."

This limestone quarry produces nine grades of material, and the 3-yd. H-90B PAYLOADER truck-loads all the production from the nine stockpiles as needed. Previously the load-out team consisted of a 1¼-yd. rubber-tired loader and two crawler loaders of 2¼ and 1½-yd. capacities. Of these three, only the 2¼-yd. crawler unit was retained — as a standby.

Aggregate producers, like A & R Stone, find that the H-90B is the "performingest" loader in its class — a powerful, fast-moving and efficient producer that is as tough as it is productive. Like all 4-wheel-drive PAYLOADER units, it has torque-proportioning differentials that discourage wheel spin-out to provide maximum traction and reduced tire wear.

The H-90B also has almost a foot more dumping clearance and more horsepower than the average of competition. It also has more stability and balance because of longer wheelbase and wider tread. In safety, in ease of control, and in protective features to insure long life and low maintenance, it is also without equal in its division. Your Hough Distributor is ready to prove that a PAYLOADER is your best bet in *any* size.

PAYLOADER

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H-70B "Loads 10 tons in 1½ minutes"

"With this Model H-70B my operator can load-out a 10-ton truck in 1½ minutes which we consider very good for a 2-yd. machine. Before we bought it, we had a competitive demonstration and it out-produced a 3-yd. machine of another make," says Harry W. Hespell, V.P. of Montgomery Stone Company, Inc., of Montgomeryville, Pa. "We have had over five years of proven PAYLOADER dependability." His operator says he "especially likes the ease of operation with the abundance of reserve power."

This long-established trap-rock quarry produces road-base, surfacing and building stone. Its all-electric crushing plant averages about 500 tons per day. The H-70B replaces an older PAYLOADER that Mr. Hespell says "gave us 5 years of proven dependability."

It takes a superior combination of power, traction, digging ability and fast cycling speed to get such output from a 2-yard machine handling large, heavy rock. It explains why the H-70B is hard to beat at *any* job.

It has 4" more dumping clearance than the average of its class, and many other "extras" that make it outstanding in performance, easy servicing and long life: sealed, pressure-controlled hydraulic system; sealed front brakes; "operator's choice" dual brake pedals (a Hough "first"); separate oil-to-air converter oil cooler; torque-proportioning differentials; easy access to engine and other service points.

Whether you need an H-70B, H-90B or a larger or smaller tractor-shovel, you'll get the most for your money from a PAYLOADER Distributor.

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● These are the first recipients of the $1,000 Louis Ware senior-year scholarships awarded by International Minerals and Chemical Corporation under the new program at 12 colleges in the United States. The scholarships—six in minerals science and six in agricultural sciences—are named for Louis Ware, board chairman of International Minerals and Chemical Corp. Seated, left to right: M. D. Merz, Stanford; W. M. Brooks, North Carolina State; W. N. Seery, Colorado School of Mines; M. M. Mathias, Purdue; S. W. Clark, Minnesota. Standing, left to right: G. A. Ekstrom, Cornell; J. C. Conway, Penn State; L. J. Hushak, Iowa State; T. N. Turner, Missouri School of Mines; G. R. Honold, Wisconsin; R. W. White, Michigan College of Mining and Technology; T. M. Ware, president of International Minerals and Chemical Corp., and C. D. Kesner, Michigan State.

April Building Awards Drop Due to Lag In Single-Family Homes

During April, contracts for future construction in the United States fell off slightly from earlier levels, according to F. W. Dodge Corporation. Awards totaled $3,297,699,000—down 2 percent from April, 1960. In evaluation, Dodge economists believe the principal cause was extreme weakness in contracts for single-family houses. They represented 74,588 homes, the lowest figure for any April in the last 6 years.

The seasonally adjusted Dodge Index of construction was 261 in April (1947-49=100), compared with 262 for March, 239 for February, and 266 for April a year ago.

Gains and losses in nonresidential building approximately balanced; principal increases were in schools, hospitals, and churches, although commercial building comprises the largest of the nonresidential categories.

Heavy engineering contracts were down despite a large percentage increase in electric utilities and a small increase in highways.

A summary of the latest figures is given in the table below.

	April, 1961	April, 1960	% Change
Nonresidential bldg.	$ 1,049,776,000	$ 1,047,751,000	—
Residential bldg.	1,454,331,000	1,479,529,000	— 2%
Heavy engineering	793,592,000	832,502,000	— 5%
Total Construction	$ 3,297,699,000	$ 3,359,782,000	—2
	4 Mo. 1961	4 Mo. 1960	% Change
Nonresidential bldg.	$ 3,682,782,000	$ 3,598,534,000	+ 2%
Residential bldg.	4,659,750,000	4,676,544,000	—
Heavy engineering	2,811,827,000	2,530,975,000	+11%
Total construction	$11,154,359,000	$10,806,053,000	+ 3%

Two years of accident-free operation at the Standard Lime and Cement Company's plant at Martinsburg, W. Va., was marked by a "victory dinner" at which management feted the plant staff and a few special guests. In recognition of 1,114,388 man-hours without a disabling injury, the National Safety Council plaque was presented to this plant.

Safety Is Important

P.C.A. Wins Sloan Award For Traffic Safety Programs

The Portland Cement Association's Tennessee district has received one of the nation's most coveted safety awards in recognition of a rush-hour radio traffic roundup that balances life saving tips against fatal statistics.

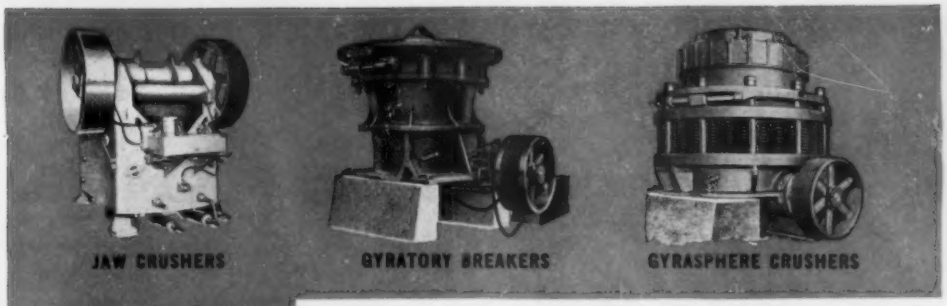
Presentation of an Alfred P. Sloan Award for the five-day-a-week program on a Nashville Station was made to John L. Feagin, district engineer, in recent ceremonies at the Waldorf Astoria Hotel in New York.

Permanente Cement Company's quarry operation in Lucerne Valley, Calif., was honored recently when it received the Sentinels of Safety Certificate of Achievement in Safety from the U. S. Bureau of Mines. The quarry men had worked 130,566 man-hours since 1959 without a lost-time accident.

Giant Portland Cement Company's plant at Harleyville, S. C., was recently awarded the Portland Cement Association's trophy for having achieved a perfect safety record during 1960. In addition, this company's operation at Egypt, Pa., also attained the same distinction.

Batch plant employees of Pacific Cement and Aggregates, Inc., were feted recently at a banquet at which they received a National Safety Council award for having worked a full year without a lost-time accident.

The Gypsum Association Safety Award has been won for the third time in four years by the personnel of the United States Gypsum Company's plant at Sigurd, Utah. This group of employees has racked up a total of 1,777 days since the last lost-time accident.

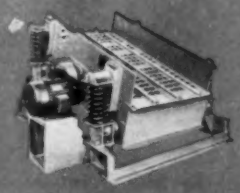


JAW CRUSHERS

GYRATORY BREAKERS

GYRASPHERE CRUSHERS

H. D. APRON FEEDERS



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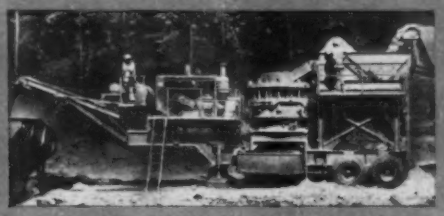
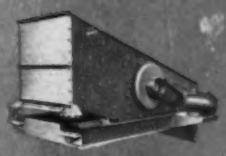
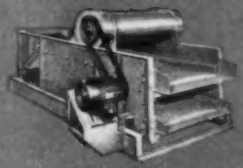


PORTABLE CRUSHING-SCREENING PLANTS



VIBRO-KING SCREENS



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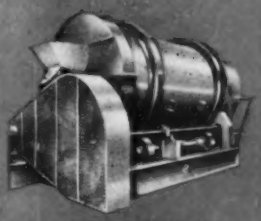
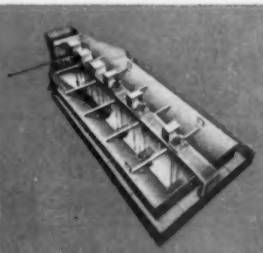


SUPER-SCRUBBERS



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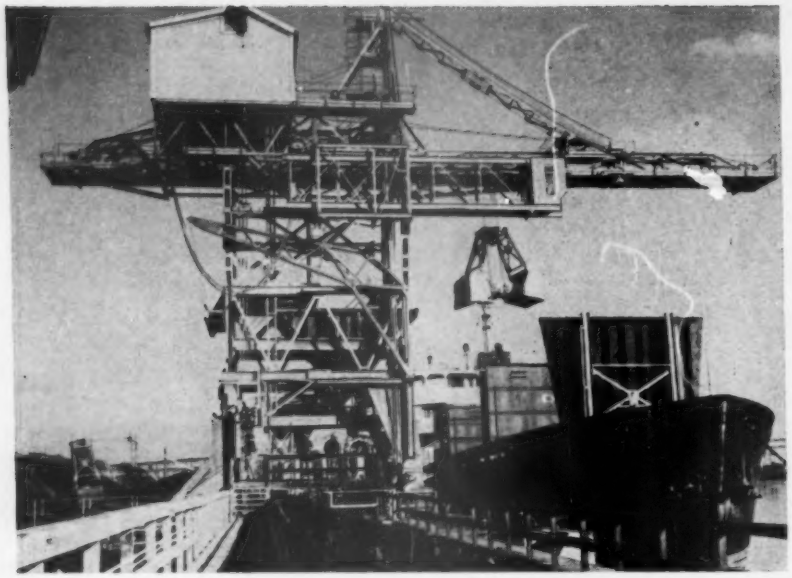


• Unloading operations at Boston's newest port facility, a terminal for unloading, storing and trans-shipping bulk cargoes. It was opened recently in Everett by the Mystic Steamship Division of Eastern Gas and Fuel Associates. In addition to handling bauxite, salt, rock, chemicals, coal and similar materials, the port will soon receive and store liquid sulphur. The port will then become the third East Coast terminal for handling quantities of molten sulphur under an extensive agreement with the Freeport Sulphur Company.

Lime Sold and Used in March 1961

Lime sold and used in the United States during March, 1961 (999,544 short tons), increased compared with the previous month, according to reports released by producers to the U. S. Bureau of Mines.

Agricultural, construction, chemical and other industrial, and refractory lime increased. Open-market lime constitutes approximately two-thirds of the total lime reported; the remainder is captive tonnage.

Lime Sold and Used by Producers in the United States, in Specified Periods of 1960-61, by Types and Major Uses in Short Tons

	February	March		January-March	
	1961	1961	1960	1961	1960
By types:					
Quicklime	710,061[2]	789,978	847,061	2,224,068[2]	2,411,983
Hydrated lime	176,367	209,566	220,654	570,929	611,289
Total lime	886,428[2]	999,544	1,067,715	2,794,997[2]	3,023,272
By uses:					
Agricultural:					
Quicklime	1,269	5,390	2,297	8,996	6,708
Hydrated lime	4,534	12,750	8,785	20,808	18,401
Total	5,803	18,140	11,082	29,804	25,109
Construction:					
Quicklime	5,194	6,899	6,892	17,468	19,685
Hydrated lime	58,093	80,412	66,240	200,732	188,349
Total	63,287	87,311	73,132	218,200	208,034
Chemical and other industrial:					
Quicklime	583,676[2]	646,538	609,578	1,828,022[2]	1,705,172
Hydrated lime	113,740	116,404	145,629	349,389	404,539
Total	697,416[2]	762,942	755,207	2,177,411[2]	2,109,711
Refractory (dead-burned dolomite)	119,922	131,151	228,294	369,582	680,418

[1]The monthly canvass excludes the output of plants producing less than 10,000 tons a year. [2]Revised figure.

Mathis Elected President Sawyer, Board Chairman Of Universal Atlas Cement

John H. Mathis, formerly executive vice-president and corporate secretary of the Lone Star Cement Corporation, was recently elected president and a director of the firm. H. A. Sawyer, chairman and president since January, 1959, and president since May, 1952, was re-elected chairman of the board and chief executive officer.

Mr. Mathis has been an officer of Lone Star for 15 years, having served as corporate secretary from 1946 to 1952, vice-president and secretary from 1942 to 1958, and executive vice-president and secretary since 1958.

Four Operations Acquired By Industrial Asphalt of Calif.

Industrial Asphalt of California, Inc., Los Angeles, recently completed the purchase of two rock crushing plants, a concrete batch plant, an asphalt mixing plant, and related equipment in the Fresno area. The purchase, involving the expenditure of $1.5 million, was made from Pollard's Concrete Company, the Channel Rock Company, Rice Brothers, Inc., and Pinedale Rock and Sand.

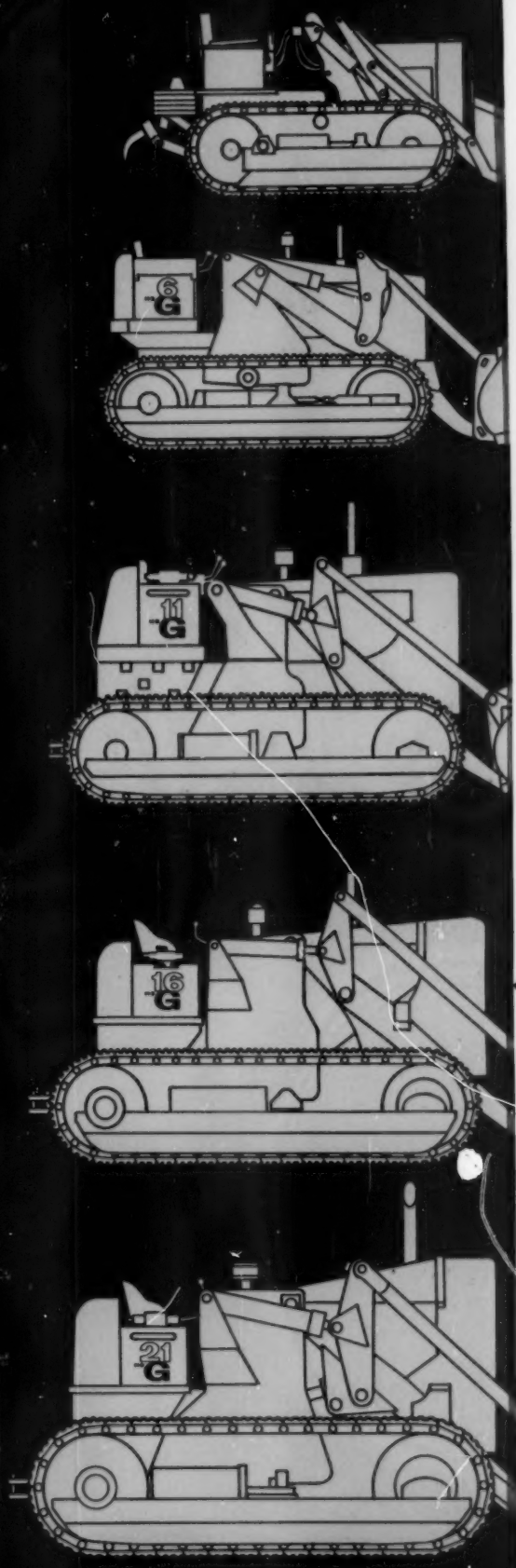
Two additional asphalt plants are scheduled to be erected immediately in order to provide service at interlocking locations in Fresno, Hanford, Sanger, and Pinedale.

H. Dean Hansen, vice-president of Industrial Asphalt, has been appointed zone manager for the new San Joaquin Valley operation, with headquarters in Fresno.

Plant Planned in Alabama For Oolite Chem-Lime, Inc.

Executives of the Oolite Chem-Lime, Inc., a newly incorporated firm formed by a group of Nashville, Tenn., men, plan to develop a $1,500,000 lime processing plant on the Tennesee River near Stevenson, Ala.

Raw material, oolitic limestone, is to be obtained from deposits near Anderson, Tenn., which are owned or held under lease by the company. Reserves of approximately 20 million tons are available.



STEP UP YOUR TRACTOR SHOVEL

Performance
Operator comfort
Wearability
Ease of maintenance
Reliability

WITH ALLIS-CHALMERS

Analyze the tractor shovel news on the following pages and see how you get the top value to which Allis-Chalmers is committed. This is the result of project "power"—a massive Allis-Chalmers research and development program that brings you the benefits of significant product improvements.

the

in

Turn to

ALLIS-CHALMERS

The line that offers you
he widest choice in the industry

in POWER

Choose the power that's right for your work from an outstanding line of tractor shovels ranging from 40 to 225 hp. In every unit, you'll get clean combustion, efficient power, low fuel consumption, with modern Allis-Chalmers diesel engines designed specifically for heavy-duty shovel service.

in CAPACITY

Select from a range of buckets from ¾ to 7¼ yd . . . lifting capacities up to 40,000 lb.

in ATTACHMENTS

Timesaving, production-boosting attachments tailor your Allis-Chalmers tractor shovels to specialized applications. A wide variety is available including rock, slag and light materials buckets; rock forks; straight and angle dozers; lift tongs and forks; pulpwood loaders; crane hooks; side booms and back hoes.

in OVER-ALL VALUE

Here is the outstanding value line in the industry. Compare size, weight, horsepower, features, and your choice will be Allis-Chalmers. Regardless of which of these tractor shovels you choose, the built-in quality insures you of top performance on your jobs at lowest possible cost.

rn to the following pages
for FACTS on how you can Step Up Your

Performance
Operator comfort
Wearability
Ease of maintenance
Reliability

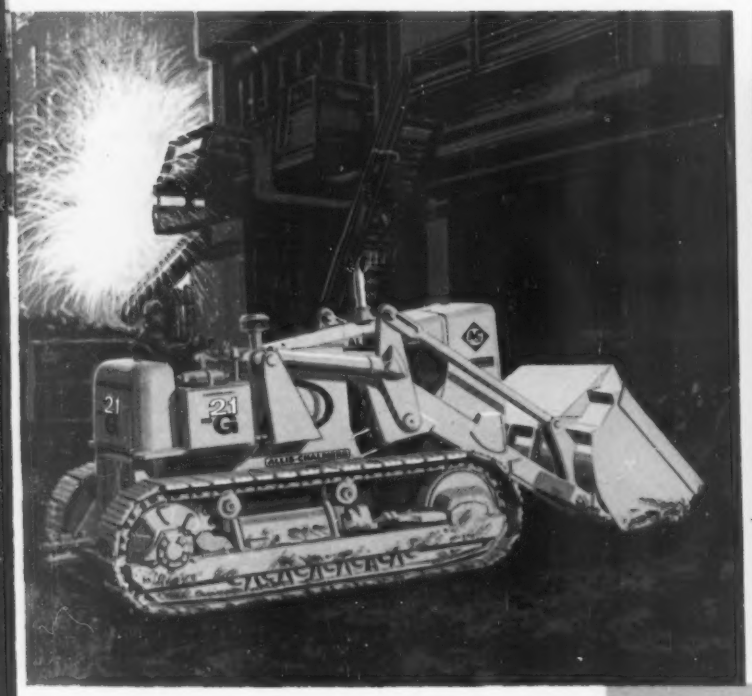
Now! Five ALLIS-CHALMERS tract shovels

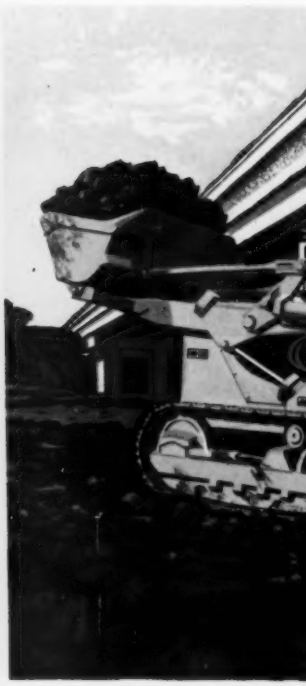
225-hp
4-YD HD-21G

150-hp
3-YD HD-16G

111-hp
2¼-YD HD-11G

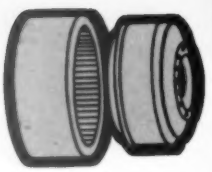
Both feature the "industry's healthiest engines"—the 21000 and 16000 . . . torque converter drives . . . power-operated oil steering clutches and oil-cooled "POWER" brakes. Transmissions in both units are pressure-lubricated with continuously filtered oil. You get capacity available in no other tractor shovels, plus proven fuel economy and improvements designed to extend service life while reducing maintenance requirements.





steel mill stamina now standard on HD-21G

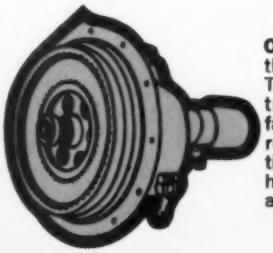
Allis-Chalmers engineers worked with steel mill men to design a tractor shovel that could perform well in the extreme heat and other torturous conditions encountered on slag removal work. The result was a bigger, tougher HD-21G. This new machine is more than two tons heavier than its predecessor. Here's a machine that will withstand the tortures of steel mill service . . . it will certainly amaze you with its ability to produce a tremendous volume of work on your regular big-shovel jobs . . . no matter how tough they may be.



NOW! a major design advance

New oil steering clutches and oil-cooled power brakes on the HD-21G and HD-16G give you new standards of performance . . . new peace of mind regarding maintenance and service life. Both clutches and brakes run in a complete bath of oil so heat is dissipated with extreme efficiency, giving you exceptionally long life with minimum brake adjustment . . . *no* clutch adjustment. New power steering and power brakes reduce operator effort, fatigue . . . help him maintain maximum production all day.

Powe ing c cons ard clutc mult meta Hydr vide



Oil m the This tra-h face rese tion, have and

s to match your job requirements

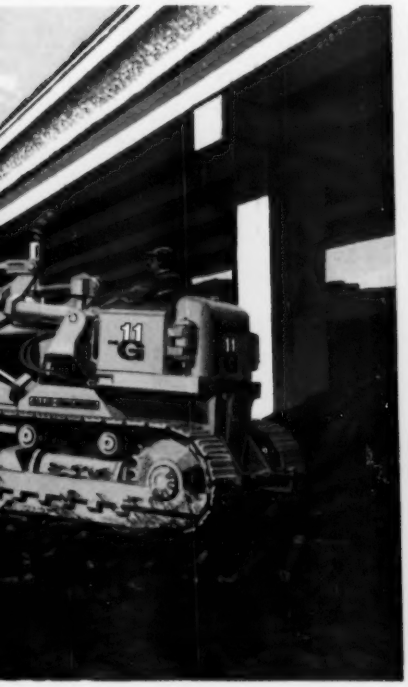
Both the HD-6G and the HD-11G feature the *fuel-sipping*, high-efficiency engines, counterparts of the 16000 and 21000, that reduce fuel consumption up to 27 percent over ordinary diesels. Both are available with your choice of oil or conventional dry-type master clutch. The HD-11G has power-boosted hydraulic steering and your choice of torque converter or all-gear drive. Both units are equipped with track-guiding truck wheel guards to protect vital track parts . . . extend life.

72-hp 1½-YD HD-6G

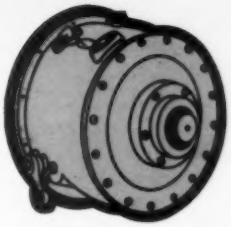
NEW ¾-YD

HD-3 40-hp diesel engine

H-3 43-hp gasoline engine

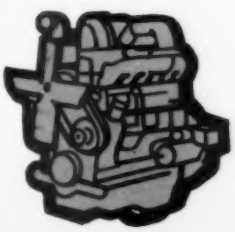


Power-boosted hydraulic steering clutches—with finger-tip, console-type levers are standard on the new HD-11G. The clutches are large-diameter, multiple-disc type with bimetallic friction surfaces. Hydraulic-boosted controls provide easy operation.



Hydraulic torque converter or conventional all-gear drive can be specified on the new HD-11G. This torque converter's outstanding fluid transfer of power automatically matches tractor speed and power to load and terrain. Operators get much more work done with less effort . . . less fatigue. The hydraulic cushioning of the torque converter protects tractor components and equipment from shock and strain.

Oil master clutch is available in the HD-11G and the HD-6G. This Allis-Chalmers clutch is extra-heavy-duty with metallic-faced plates providing plenty of reserve capacity for cool operation, less wear, longer life. Both have independent oil reservoirs and filters.



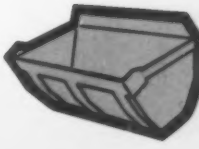
10000 engine powers the HD-11G. The 6000 engine is featured in the HD-6G. Both are fast-starting, responsive, with high torque for top performance in today's tough service. They are open-chamber, controlled-combustion engines delivering high output without even breathing hard.

big performance in a compact package

Both of the 4-cylinder engines, 149-cu-in. gasoline and 175-cu-in. diesel, provide high torque with plenty of lugability for top performance at low cost.

Oil-type shuttle clutch lets you go forward or reverse simply by moving a single lever . . . no foot clutching or gear shifting necessary. Transmission has four gear speeds . . . forward and reverse. Select your working speed and work away simply by moving shuttle clutch lever back and forth.

Two buckets are available . . . 66-in., ⅞-yd and 60-in., ¾-yd. The loader produces more than 8,000-lb break-out force . . . lifts 3,600-lb, 10-ft high.



you get all the

BASIC ADVANTAGES

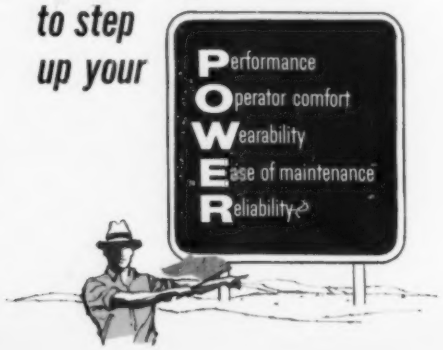
that have made Allis-Chalmers the leader in Tractor Shovels

In 1947, Allis-Chalmers introduced the first truly successful hydraulically controlled tractor shovel revealing entirely new concepts in earth moving and material handling. Called the HD-5G, it was engineered as a complete unit with the speed, strength and capacity to handle an infinite variety of excavating and loading jobs.

Through the years, Allis-Chalmers has increased this leadership as it improved and expanded its tractor shovel line to match modern job requirements. Recognized advantages, like tractor and shovel designed as a unit for exceptional strength and visibility . . . advanced linkage design for outstanding reach and stability . . . curved bottom bucket with big pry-out action . . . reflect the company's leadership. The ever-lengthening list of firsts in basic tractor features like torque converter drive, unit construction and extended lube intervals, are a few of the many reasons for the company's continuing reputation as the *house of quality*.

For digging and loading all materials at lower cost than ever before, go with the leader—Allis-Chalmers. Nothing matches its design quality, solid construction, operating ease and maintenance simplicity for lively, dependable performance.

Plus everything that's new to step up your



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Your Allis-Chalmers dealer is in business to . . .

PROTECT YOUR EQUIPMENT INVESTMENT WITH COMPLETE SERVICE

When you invest in Allis-Chalmers equipment, you get top performance in *every respect*. Your Allis-Chalmers dealer is fully equipped to serve you completely, conveniently. Make him your single source for:

Complete Parts Service—original-quality parts on hand to meet your requirements quickly.

Ready-to-go Exchange Assemblies—completely reconditioned assemblies on call. Your trade-in assembly is rebuilt without overtime charges . . . your machine is back to work quickly. Your cost? Only parts and regular-time labor needed to recondition your old assembly.

- **Specialized Service—Shop or Field**—top-notch mechanics are factory-trained to service your needs efficiently in a fully equipped shop or on your job.
- **Tailored Financing**—terms suited exactly to the financial requirements of all your machinery needs.

From one convenient source, then, you get the complete service package—job application information, new and used equipment, parts, service and financing. Who could be more interested in backing you up than your dealer? That's his *business!*

Your every transaction in sales, parts, service and financing is fully backed and.....

Certified FOR YOUR PROTECTION
BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER

ALLIS-CHALMERS

POWER **FOR A GROWING WORLD**

Litho in U. S. A.

The 24-ft. scalping-classifying tank at upper right has been fitted with a longitudinal divider plate which permits the unit to operate with about 600 g.p.m. of water—approximately half the normal gallonage required.

Novel Equipment Revision Offsets Water Shortage

A problem encountered more frequently in washing plant operations throughout the country—increasing shortage of water—has been solved in an interesting and effective manner by a New York sand and gravel producer.

In the Schaltry Sand Company operation near Schenectady, mason's and concrete sands are produced in a washing section comprised of a 30-in. by 25-ft. Eagle Iron Works single-screw fine-material washer-classifier-dehydrator, and a recently installed 24-ft. Eagle scalping-classifying tank with a 3-cell collecting-blending flume.

Normally, the latter would operate with approximately 1,200 g.p.m. of water. However, water was in short supply at this plant, and management asked the manufacturer to equip the tank with a longitudinal divider plate, the idea being that the plate could be set in such a manner that the tank could operate on about half the normal gallonage of water.

Schaltry management has indicated that the unusual revision is working out quite satisfactorily, and production of the washing section averages well over 50 t.p.h. It is noted that the deposit is fortunately low in silt; otherwise the arrangement would probably not have been feasible.

Distribution Plant Planned In W. Va. for Columbia Cement

Columbia Cement Corporation spokesmen have announced that a cement distribution point will be established at Nitro, W. Va. Columbia Cement, which operates a plant at Zanesville, Ohio, is a wholly owned subsidiary of Pittsburgh Plate Glass Company.

The new facility will have three precast concrete stave silos with a combined capacity of 10,000 bbl. Cement will be shipped in by rail and loaded into bulk transport trucks by air conveyors. Dust collection equipment will be installed for clean operation. This will be Columbia's first distribution station.

At St. Helens, Oreg., employees of the Kaiser Gypsum plant won the National Safety Council's highest award for safety achievement for the third consecutive year. Two other safety awards were also received — the President's (W. A. Marsh) Cup, for completing 1960 without a disabling injury; and the Oregon Award of Merit for efforts in the interest of safety.

Philippine Cement Plant To Produce 3,000 Bbl. Daily

Construction of a dry-process cement plant, the first on the island of Mindanao, has begun at Iligan City. Productive capacity is to be 3,000 bbl. per day. The cost of the facility, which will consist of the plant proper and a quarry, will be approximately $8 million. It will be financed jointly by private Philippine capital and a loan from the (U. S.) Development Loan Fund.

Plant personnel slated for managerial and supervisory positions will be brought to the United States to be trained by Turnbull, Inc., Cleveland, Ohio, which is designing and supervising construction.

Australian Bauxite Plant To Supply $100 Million Project

Alcoa of Australia Proprietary Ltd., newest overseas venture of Aluminum Company of America, has been formed to establish and operate a $100 million integrated aluminum complex on that continent.

The project will include bauxite mining facilities for processing high quality material from deposits near Perth, on Australia's west coast. The processing plant, to be completed in 1964, will have sufficient capacity to supply the needs of Alcoa of Australia and also of consumers elsewhere.

Expansion at Joliette Planned By Gypsum, Lime & Alabastine

Plans are being prepared for a $2,000,000 expansion at the Joliette, Quebec, plant of Gypsum, Lime & Alabastine, Ltd., Montreal.

Additions to the present facilities will include a rotary lime kiln and a crushing and screening plant. The new equipment will increase lime production by more than 200 tons per day; and crushed stone in all commercial sizes will be produced at the rate of more than one million tons annually.

CARL A. ROBISON, 61, purchasing agent for 18 years for the Kosmos Portland Cement Company, Louisville, Ky., died at a hospital in that city.

IF YOUR CRAWLERS HAVE "CLASH BOXES" BETTER CHECK THE ADVANTAGES OF THE "EUC" C-6

Without full-power shift even a "brand new" tractor is an obsolete machine in performance and work-ability when compared with the new Euclid C-6 crawler. For the fast response and all-around versatility that's needed in mines, quarries, construction and industrial work, no other tractor has all the advantages you get in the C-6.

Proven Torqmatic Drive provides full-power shift and instant reverse without delay for clutching and shifting . . . with a flick of the wrist you change direction or from one speed range to another. It's the same easy-to-operate power train that has proved its dependable service in thousands of other earthmovers.

Get the facts on how the C-6 can cut costs on your jobs . . . from dozing and ripping to push-loading big scrapers. You'll find the many operating advantages of this modern tractor will bring you a better return on your investment.

EUCLID DIVISION OF GENERAL MOTORS, CORP., CLEVELAND 17, OHIO

DOZING and RIPPING **. . . plenty of power, easy operation and good stability make the C-6 tops for work in rough going and heavy material.**

GM GENERAL MOTORS EUCLID

EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

Industry Personalities

B. E. Miller

BLAINE E. MILLER has been promoted to the position of assistant general sales manager, commercial, for Huron Portland Cement Company.

Mr. Miller has been manager of the Michigan Division of the company since 1957, and has had charge of outstate Michigan and Indiana sales.

S. A. SCOTT has been appointed chief mining engineer and FRANK C. PICKARD manager of prospect development in the Mining and Exploration Department of International Minerals & Chemical Corporation.

At the same time DR. DONALD H. FREAS was appointed geologist and DAVID M. WILLIAMS mining engineer.

Mr. Scott will continue to act as shaft sinking superintendent at the firm's Esterhazy, Sask., potash project until its completion.

Mr. Pickard has been project engineer at the Esterhazy development for the last four years.

THOMAS F. O'LEARY, Wellesley Hills, Mass., was recently named sales engineer for construction chemicals with the Dewey and Almy Chemicals Division, W. R. Grace and Company, Cambridge, Mass.

ROBERT L. FINEWOOD, Rochester, N.Y., was chosen president of the Empire State Sand, Gravel and Ready Mix Association for a one-year term at the association's 10th annual convention. Frank Cooney, Tarrytown, is vice-president; William Maginn, Massena, is secretary; and Henry Kirwin, Utica, is treasurer.

J. J. OFFUTT, vice-president and general manager of the A. P. Green Fire Brick Company, has been elected to the firm's board of directors to succeed W. H. PETERSON SR., who recently resigned.

D. M. Gentile

DANIEL M. GENTILE has been appointed general superintendent of operations for the Cleveland and Mansfield (Ohio) district of The Kaiser-Nelson Company, Cleveland. He was formerly vice-president of American Construction Company. Kaiser-Nelson is engaged in slag reclamation, production of sand and gravel, and plant demolition.

J. W. Ettinger

J. W. ETTINGER is the new sales manager for the Oklahoma Cement Company.

He was formerly associated with the Universal Atlas Cement Company as a sales representative, and most recently as the firm's assistant sales manager for Oklahoma, Arkansas, Missouri, and Kansas. He will maintain offices in Tulsa at the company's headquarters.

ROBERT MITCHELL, president of the Consolidated Rock Products Company, Los Angeles, recently received a Gold Knight Award from the Southern California area council of the National Management Association, signifying that he was chosen industrialist of the year. Mr. Mitchell is a past-president of the National Sand and Gravel Association and of the National Ready Mixed Concrete Association.

H. P. Eells Jr.

H. P. EELLS JR. has been elected to the post of chairman and chief executive officer of Basic Incorporated, Cleveland, Ohio, a newly created office. He has served Basic Incorporated as president since 1919.

WARNER B. BISHOP, former vice-president, sales, succeeds Mr. Eells

W. B. Bishop

M. J. Ludwig

as president. Mr. Bishop and MATTHEW J. LUDWIG, vice-president-controller, were elected to the board of directors after action taken by that group to increase its membership to nine.

HAROLD W. HANSON has been appointed senior planning engineer of the Paving Bureau for the Portland Cement Association in November, 1960. In a career covering more than 20 years as a civil engineer, he has held many responsible positions with both governmental and private organizations.

LOUIS B. HARTLAGE JR. was recently promoted to the post of traffic manager of the Louisville Cement Company, Louisville, Ky. He succeeds the late Charles T. Coleman in this office.

TOM MOBLEY has been promoted to the position of assistant sales manager of the Kosmos Portland Cement Company, Louisville, Ky.

Whichever they have to load, truck or gondola, McDonough's 4½ yd Michigans do the job fast. Typical 12 yd semi takes 1 to 1½ minutes, 70 ton railroad car five minutes or less.

Sister quarries share
Michigan Tractor Shovel fleet, report

6 machines do the work of 12

At McDonough Brothers' two quarries near San Antonio, Texas, six Michigan Tractor Shovels are doing the material handling normally assigned a fleet of loaders *and dozers* at least twice as big.

Power, speed, and capacity of their five 262 hp 4½ yd Model 275A Michigans take care of all the heavy work (except shot rock loading) at both quarries, both crushers, and at an adjacent 7500 lb continuous-mix bituminous plant . . . while a smaller 1¼ yd Model 75A stockpile-loads the 4 and 6 yd trucks and handles scattered odd jobs.

All told, the Michigans regularly handle eight major jobs:

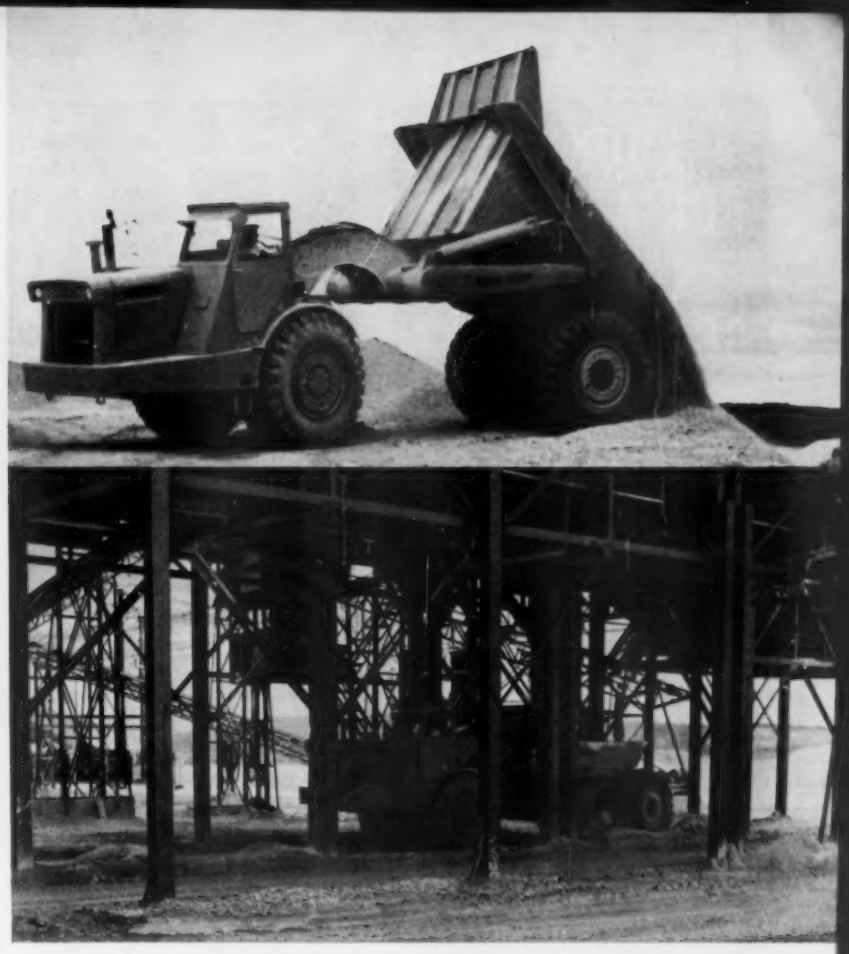
- Load all trucks hauling stockpiled materials produced by both crushing plants . . . twenty-four or more separate stockpiles.
- Dress all stockpiles.
- Load one-third of all 70 ton railroad gondola cars at both plants.
- Replace donkey engines for moving and spotting gondolas.
- Load all trucks hauling aggregates and sand to charge the bituminous plant.
- Truck-load finished bituminous materials.

- Clean quarry floors after blastings and push shots up to the heavy rock shovels for loading.
- Maintain all haul roads in all plant areas.

Michigans load in record time, get job assignments by 2-way radio

Loading time on all these assignments has proved exceptionally fast. A typical 12 yd semi is loaded in only 3 passes of a Model 275A's 4½ yd bucket *and an average of 72 seconds.* A typical 70 ton gondola car is loaded in 5 minutes or less.

Two-way radios help save time too. As a haul unit enters either McDonough yard, the central control station located at the scale house radios the Michigan working nearest the required stockpile. Over the Michigan drives, fast as the truck. Time is also saved by radio-directing the speedy Michigans to other assignments over the one-half mile radius between the two quarries. With this system, maximum production is maintained . . . idle machine time virtually eliminated.



Two new 25-ton Michigan Model 210 Tractor Wagons have also been recently added to McDonough Brothers' Michigan equipment spread. Replacing several large tandem-dump trucks, the rear dump Michigans haul aggregates from hopper to assorted stockpiles up to 3,000 feet distant . . . and feed the bituminous plant when it is operating. Occasionally, too, the hefty 31.4 mph units fill in as shot rock haulers when one of the rock hauling trucks is down for repairs.

Dependability a prime reason why McDonough Brothers prefer Michigans

McDonough Brothers purchased their first Michigan five years ago—a Model 175A with 2¾ yd bucket. Three years, and over 10,000 meter hours later, it was traded for a larger Model 275A. Then expanding operations, combined with Michigan's excellent performance, caused the addition of four more Model 275A Michigans and one Model 75A to bring the fleet up to present strength.

Typical of the performance turned in by the Michigans today is an hourmeter reading taken at random from one Model 275A. In 17 months of operation, it showed 4,915 hours —an average of 66.4 hours worked each week since purchase.

Co-owners Jim, Dan and John McDonough are completely satisfied with their Michigan units. "Michigan Tractor Shovels have proven highly successful in our quarry operations," reports Jim McDonough, "And we like the dealer service organization (Waukesha Sales & Service, Inc., San Antonio, Texas) behind them."

In addition to loading and stockpiling, Michigans perform other quarry jobs such as floor cleanup, haul road maintenance and switching of 70 ton gondola cars.

Demonstrate? Glad to!

Your Michigan Distributor will be glad to demonstrate a Michigan Tractor Shovel *on your job* at no obligation. Call him and select the size that best fits your operations . . . nine models . . . with lift capacities from 3,000 to 29,000 lbs.

Michigan is a registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK® EQUIPMENT

2479 Pipestone Road
Benton Harbor 2, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

Enter 38-D on card, page 241

LOOKING FOR A BETTER SAND AND GRAVEL PUMP?

PEKOR'S NEW **"TELLTALE"** TYPE D-T HEAVY DUTY CENTRIFUGAL SAND AND GRAVEL PUMP.

Available with either tough semi-steel or best-in-the-long-run Ni-Hard wearing parts in 4", 6", 8", 6x8" suction and 8x10" suction. Now available also in either alloy. 45x90" extra-heavy long-radius flanged elbows.

Have a Look at the TYPE D-T HEAVY DUTY "TELLTALE" PUMP

Wherever it has been put to work it's production is the talk of materials people. Likewise, what it can take under what would be heavy overloading for an ordinary pump.

-LOW IN DOWNTIME
-HIGH IN PRODUCTION

"TELLTALE" is the only pump that warns when it's time to reline. Air sucked through periphery ports causes pumps to lose its prime. Pumping stops. Water leaking through the ports signals that the shell liner and the surrounding belt of packing have worn through.

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LOCK DRAWER 909
COLUMBUS, GEORGIA

Enter 38-F on card, page 241

P. E. Galer

RICHARD E. GALER has been named to succeed the late FRANCIS A. MCADAM as director of research and development for Huron Portland Cement Company. Prior to the appointment, Mr. Galer had been chemical engineer of Huron's Alpena manufacturing plant. He previously had been a member of the production research staff at Wyandotte Chemicals Corporation.

JESSE J. JACOBSON, manager of Limestone Products Division, Menominee, Mich., has been named general sales manager of the Lake Michigan Division of North Western-Hanna Fuel Company, with headquarters at Milwaukee, Wis. (Limestone Products Company was purchased by North Western-Hanna Fuel Company in 1958.)

Mr. Jacobsen has been with Limestone Products since 1947 and will continue as manager of that division in addition to his new duties.

ROBERT W. TOMLINSON has been named manager of purchases of the Alpha Portland Cement Company, Easton, Pa. He assumes the duties formerly held by the late Ray L. Hamilton.

D. C. MCCONKEY, assistant secretary and controller of the Canadian Gypsum Company, Toronto, was recently elected president of the Controllers Institute of America (Toronto control).

JEAN LONGY, sales manager for Quebec Province, St. Lawrence Cement Company, has been appointed a vice-president. His headquarters will be in Montreal.

DR. JAMES A. CROOKSTON has been named director of research for the A. P. Green Fire Brick Company. He will be responsible for directing research activities for all products and plants.

Dr. Crookston has been associated with the Green Company since 1955. Prior to assuming his new position he was manager of new product development.

H. L. EVANS has been appointed to the newly-created position of vice-president of general manufacturing, The Flintkote Company. He formerly was vice-president of manufacturing, Flintkote Division.

In his new post, Mr. Evans will assume co-ordinating responsibility for plant facilities planning and operations and will be concerned with all aspects of manufacturing. Mr. Evans will continue to be headquartered at the Flintkote plant in East Rutherford, N. J.

F. A. Wagner

FRED A. WAGNER has been elected treasurer of the National Gypsum Company by the firm's board of directors, succeeding WALTER S. CORRIE, who is retiring after 33 years of service with the company.

At the same time R. ROY HARLEY was elected assistant treasurer.

Mr. Wagner was previously assistant treasurer. He joined the company in 1942.

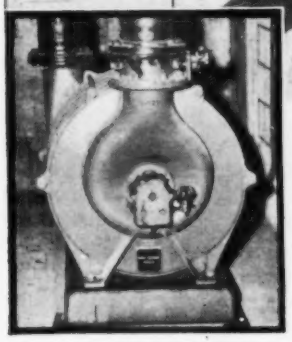
Mr. Corrie has been with the company since 1928. In 1946 he became treasurer. He will continue to serve in a consulting capacity.

Mr. Harley has been with National Gypsum since 1942.

W. S. Corrie

R. R. Harley

NOW—Stop the Cost Spiral with HOFFMAN fast pick-up and delivery



This 10 hp blower furnishes clean, dry air to Air-Float conveyor

What goes up must come down certainly has not applied to the cost of running a cement plant. One way to halt the rising cost spiral is by maximating production with the help of Hoffman vacuum cleaning machinery and multistage centrifugal blowers.

PAY THEIR WAY QUICKLY Rugged, sturdy multipurpose Hoffman industrial vacuum cleaning/conveying equipment offers these ways to cut costs.

1—Provide fast *pick-up* of spilled cement from cars and trucks at loading areas

2—Recover finished cement spills around the packhouse

3—Remove abrasive dust from mill room machinery

4—Pick up clinker dust around the kiln section

5—Pneumatically sweep crushing and screening areas

6—Reclaim limestone, sand, trap rock and other dry materials before air and moisture cause deterioration

7—Improve working conditions, reduce expenditures for maintenance and recover valuable products

8—The high suction centrifugal exhausters and heavy duty dust separators permit cleaning operations to be carried on at various points in the plant with collection of mat rials at a central location

BLOWERS HANDLE TOUGH JOBS TOO The multistage centrifugal unit which is the heart of every Hoffman pneumatic system also deals with a wide range of cement plant duties including: combustion air for rotary kilns • fluidizing cement conveyors • aerating storage bins and silos.

RUGGED CONSTRUCTION Hoffman centrifugal blowers have outboard mounted bearings and are designed for direct-coupled drive by any standard motor. One piece cast aluminum impellers are keyed and locked to a heavy steel shaft. The complete rotating assembly is dynamically balanced to insure smooth vibration-free operation. There are no internal wearing parts—no possibility of contamination from oil or grease. Hoffman cast iron centrifugals *deliver* a continuous supply of clean, dry air.

MAXIMATION IN YOUR PLANT To learn how Hoffman industrial air handling equipment can maximate operations in your plant, write for latest catalogues.

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Conference on Radioisotopes Covers Present, Future Uses In Mineral Processing

THE recent conference on radioisotope applications in mining and mineral processing, held at Denver, Colo., in April, highlighted the significant growth in areas where these materials can be effectively utilized. This conference, sponsored by the American Mining Congress and the Colorado School of Mines Research Foundation, Inc., in cooperation with the Office of Isotopes Development of the Atomic Energy Commission, was attended by more than 200 operators and manufacturers of mining equipment.

Dr. Paul C. Aebersold, director of the Office of Isotopes Development, pointed out that there are more than 1,700 major industrial organizations now using radioisotopes to carry out their manufacturing and research activities more quickly, easily, and cheaply.

A radioisotope was described as an unstable atom, which because of its characteristic of "breaking down" emits radiation — perhaps heavy, short-range alpha particles; or light beta particles that can penetrate or be reflected from thin materials; and in most cases very penetrating gamma rays.

According to Harold J. Rose, consultant, Nuclear Science and Engineering Corporation, Pittsburgh, Pa., some of the inherent advantages in using radioisotope techniques are great sensitivity, penetration, and tracing. Among the areas where these may be applied are mineral exploration, mining operations, preparation processes, material handling, and equipment maintenance.

Probably the most extensive use in the mining industry, to date, has been in preparation processes where nuclear techniques have been applied to recording and controlling of density, viscosity, composition, and regeneration of heavy-media baths; and in controlling density of slurries and pulps. Another area of considerable promise is in equipment development, *i.e.*, the movement of individual particles or fractions in jigging or heavy-media processes can be studied.

In material handling, radioisotopes have been used in monitoring bin storage; in measuring density and moisture content of bulk materials in weighing materials in motion; and in safety devices.

The true measure of the value of radioisotopes applications, said P. E. Ohmart, president, Ohmart Corporation, Cincinnati, Ohio, is whether it will be profitable to the operator. Substantial monetary benefits have already been recorded in many installations, it was noted. Among these are a nuclear density gauge application where cement milling efficiency and production were increased; an application to kiln operation where excessively hot areas were corrected, resulting in significant refractory saving; the use of an instrument to control positioning of a dredge suction head; and an installation for maintaining constant gravity of heavy media fluids.

It was pointed out that equipment now on the market is rugged enough to withstand almost any kind of hard treatment—even fire up to 2,500 deg. F., that it is safe, and that it is available in many sizes adaptable to varied conditions.

O. K. Neville, vice-president,Nuclear-Chicago Corporation, Franklin Park, Ill., pointed out that nuclear gauges are built to do specific jobs, accounting for the variety of devices and applications, and that the average industrial user need not be particularly concerned about its radioactive features. However, research scientists may have reason to delve into the radiation source of such instruments, and should be thoroughly familiar with their characteristics and hazards.

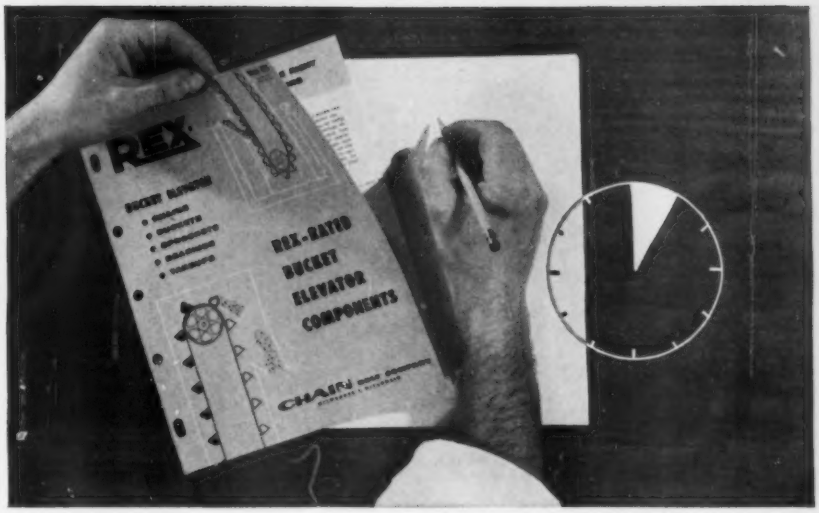
There are functions that specific gauges can or cannot do, it was noted. For example, slurry gauges are quite effective in controlling density of fluids in pipelines, but cannot measure moisture in bulk solids. (For the latter, a bulk moisture gauge which operates on the principle of the reflection of radiation rather than transmission, should be used.)

Some of the advantages of radioisotope installations were noted by James Gary, Colorado School of Mines Research Foundation, Inc. Among these is the fact that the devices can be put in place without interfering with plant operation; they are not affected by the material they are measuring; and they require the minimum of maintenance. Each type of radiation, it was indicated, has its own properties, and it is important to select the best type for a particular job.

T. R. Young, of the research foundation, described experiments on measuring wear in pipelines. These involved inserting an irradiated segment of pipe in line, which was then tested under operating conditions. The amount of radioactivity in material flowing through the pipe was measured, and since the radioactivity is directly proportional to the amount of metal worn away it is possible to determine the amount of wear under various conditions.

P. J. Blaetus, of the Office of Isotope Development, A.E.C., stated that advantage could be taken of many of the present radioisotope techniques without extensive training or licensing. The suppliers of nuclear devices install and recalibrate the equipment periodically to assure continuing safe operation. However, if the radioactivity source is large, trained personnel are required. The training is readily available.

NOW, SELECT BUCKET ELEVATOR COMPONENTS IN LESS THAN FIVE MINUTES



New Rex Selection Tables condense 70 years' experience into a simple 5-minute guide

Here's the industry's quickest, simplest way to select the correct components for your bucket elevators.

It's not only fast—it's accurate; it's easy! In a few simple steps it leads you to the equipment that will meet your specific service requirements most economically: chains, buckets, sprockets, bearings and take-ups.

All you have to know are the type of material you are handling and your required volume and lifting height. You just feed this basic information into the Rex Selection Tables. Here your requirements are fully analyzed—and out come your selections, clear and correct.

Rex Selection Tables are contained in the new Rex Rated Bucket Elevator Components Bulletin No. 6057. Send for your free copy today.

CHAIN Belt Company, 4604 W. Greenfield Ave., Milwaukee 1, Wis. (In Canada: Rex Chainbelt (Canada) Ltd., Toronto and Montreal)

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Obituaries

RAYMOND H. LUTZ, 50, president of the Edward Lutz Sand and Gravel Company, Inc., Milwaukee, Wis., died after surgery on June 3. He had been ill for several years. Mr. Lutz joined his family's firm in 1929 and served in several posts.

J. ALAN WHYTE, 69, former vice-president of the Gifford-Hill operations in Texarkana, Tex., died on May 8 in that city. He had served as a Gifford-Hill executive from 1944 until his retirement last October. Mr. Whyte was also a director of Gifford-Hill subsidiaries.

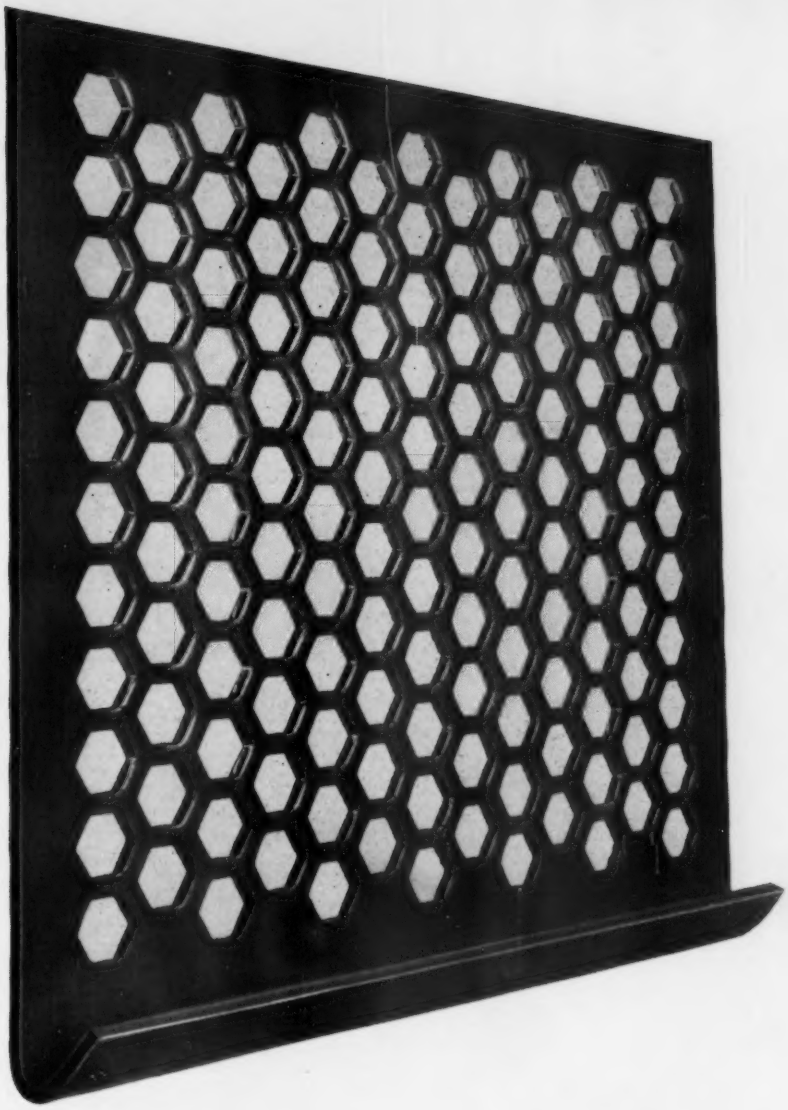
EDWARD O'TOOLE, 77, president of the Glacier Sand and Stone Company, died on May 4 in Westwood, Mass.

WILBERT P. SABIN, retired vice-president of Ash Grove Lime & Portland Cement Company, Kansas City, Mo., died in Okmulgee, Okla., on June 2. Mr. Sabin was 86 years old. He retired from Ash Grove at the age of 70.

WILLIAM C. KNAPP, 57, vice-president, financial and accounting, of the Arundel Corporation, Baltimore, Md., died on June 5. Mr. Knapp joined Arundel in 1943 as controller and subsequently served as vice-president and finally in his last post. He was also a director and a member of the firm's executive committee.

In addition he was for many years controller and a director of the Maryland Slag Company and a director of the Baltimore Brick Company.

CHARLES BLACK SR., president of Charles Black Sand and Gravel Company, Fluker, La., died in April at his home in Hammond, La. He was 80 years old.



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Hendrick perforated metal screens are manufactured under the most rigid quality-control specifications. Their precision perforations are clear cut and uniform . . . assure continued screening uniformity . . . eliminate blinding. And with Hendrick perforated plates you can screen aggregates faster because their larger open area permits better draining . . . deck changes are also made faster—you save on downtime and labor costs.

Hendrick quality steel perforated plate is made from high carbon or heat treated steels. It is available either flat or corrugated in any desired shape and with perforations of any size. Furnished with standard hook flanges for easy attachment to any vibrator. For more details, mail in the attached coupon today!

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Carbondale, Penna.

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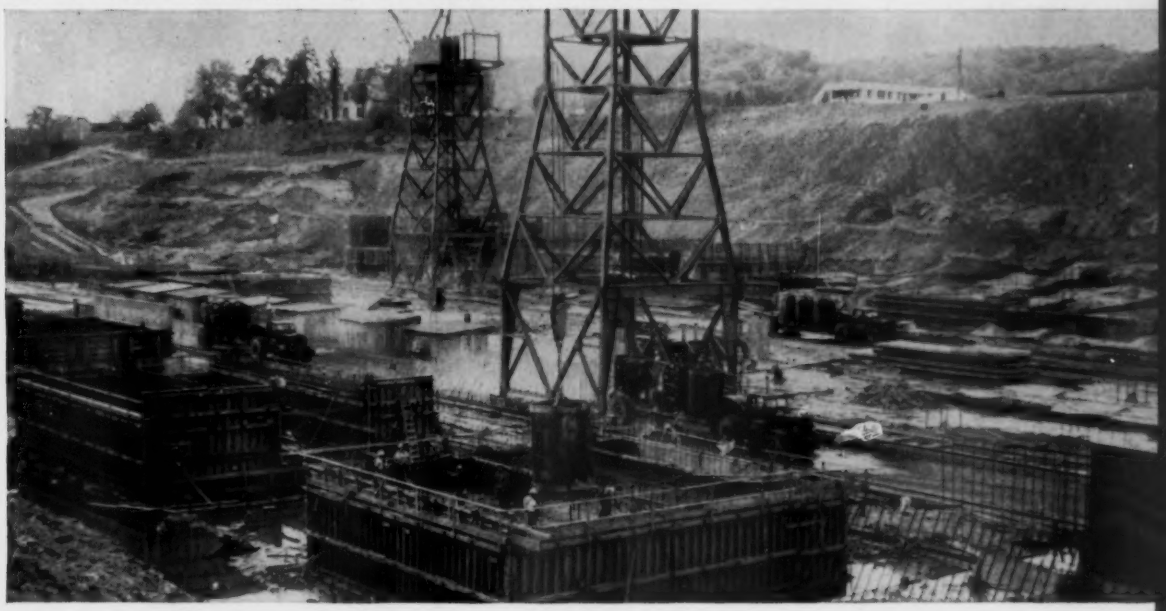
B.F.Goodrich helps unlock Ohio River traffic jam

WITH TIRES, HOSE AND OTHER PRODUCTS, B.F.GOODRICH SPEEDS CONSTRUCTION OF NEW NAVIGATION SYSTEM

Time was when traffic was slowed by 4 separate locks in a 95-mile stretch of the Ohio River. But the Capt. Anthony Meldahl Locks and Dam will flood them. This project is part of a modern navigation system that will reduce 13 locks and dams to 3, and lockage time from 19½ hours to 1½ hours.

Groves Ventures Company of Minneapolis, Minnesota, a joint venture sponsored by S. J. Groves & Sons Co., is on the job with an army of B.F.Goodrich tires and always-available BFG tire service. Rock Service tires, for example, haul 33-ton loads of concrete from batch plant to lock forms over rock-strewn roads. No problem for these BFG giants, though. They're available in new

33 TONS OF CONCRETE leave batch plant (photo at left) bound for lock pouring area (below). Locks will be 110′ x 1200′, will require over 670-thousand cubic yards of concrete, will cost over $25-million. B.F.Goodrich Rock Service and Rock Rib tires haul concrete 16 hours a day, 6 days a week down 2 long grades into the cofferdam excavation. Roads are covered with crushed rock and gravel, and often with 6″ of water. Yet BFG tires give exceptional service, Groves Ventures reports.



B.F.GOODRICH ON-THE-JOB TIRE SERVICE keeps Groves Ventures equipment rolling on lock project near Chilo, Ohio—keeps tire costs at a minimum. The BFG Servicemobile and repair shop are manned by tire experts, whose workmanship prompts Project Manager W. J. Green to write, "B.F.Goodrich service and repair facilities have done an excellent job of covering our needs."

NO STING IN THIS STEAM HOSE, used to cure concrete at Capt. Anthony Meldahl locks. It's Burstproof hose, made of BFG-developed heat-resistant rubber with layers of braided wire reinforcement. It can't explode. Supplying Groves Ventures with hose, belting and protective clothing—as well as tires—is all part of the BFG Unified Contractor Program. Contractors benefit from lower costs and better rubber products' service with this new BFG program.

Cut Protected compound that defies tire-killing rock.

B.F.Goodrich Flex-Rite Nylon cord construction withstands double the impact of ordinary materials, resists heat blowouts and flex breaks. Result: more retreadable tires. No wonder Groves Ventures specifies BFG tires.

You'll find B.F.Goodrich hose, protective clothing and other products at work here—all part of the BFG Unified Contractor Program that helps contractors cut costs and get better service from rubber products. Call your nearby B.F.Goodrich Smileage dealer (listed under Tires in the Yellow Pages). He has the know-how to help make your next contract more profitable. *The B.F.Goodrich Company, Akron 18, Ohio.*

Specify **B.F.Goodrich Tubeless or tube-type tires when ordering new equipment**

B.F.Goodrich

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Take 15 minutes on a

Prove New International TD-15 cost-cutting capacity tops the 100 hp class

Advantages in heavy-duty hp and in working speeds give the new TD-15 extra work capacity to cut costs, boost earnings — as compared to competitive rigs. *You can prove it, positively.* Advances in strength, wear-resistance, temperature control, and operating ease mean big gains in component life, upkeep economy and machine availability to owners of new International TD-15's. *You can prove it, beyond doubt, without risk.* Let your International Construction Equipment Distributor give you the revealing 15-minute new "15" demonstration, now!

Prove new TD-15 capacity dozing heavy materials

Fast, easy new TD-15 shifting saves effort, increases output. Size up the new "15's six-speed, full-reverse transmission with speeds spaced to use extra power and often work a *speed faster* than competitive rigs. See how the six speeds forward, six reverse, are arranged for easy short-travel, single-stick shifting. Change forward-reverse direction fast with the "Shuttle-Bar." Check the power-transfer efficiency and operating ease of the new "15's heat-defying, dry-type sintered metal engine clutch!

Give the new "15" a steady job of bulldozing solid materials! Advances like tapered, anti-friction bearings of greatly increased capacity — heavier shafts and deeper, stronger gear teeth — add thousands of hours to transmission component life. New transmission oil pump circulates and filters lubricant for longer gear life. Measure the added economy of features like the new sintered metal steering clutch discs which outlast previous type even while handling greater torque loads!

International® Construction Equipment

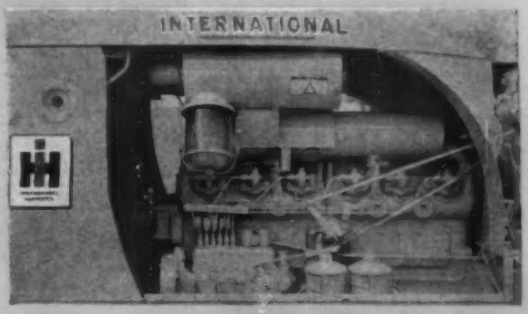
International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE

New "15" (151 SERIES)

Compare hp and performance protection!

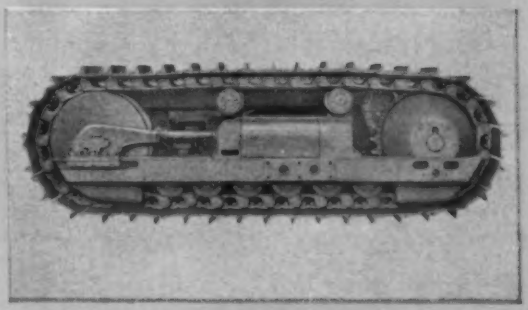
Start the new TD-15's 6-cylinder engine push-button easy — and get the seconds-fast warm-up which only International's famous gasoline-conversion starting provides. Note that *full load* for the new "15" is an overload for other rigs of the 100-hp class. See how the new pressure-type cooling teams with the larger capacity radiator — to give positive temperature control in hottest weather at full capacity 'round the clock.

Look at the "15's" new dry-type air cleaner. It's 99.8% efficient — and 100% convenient! Handy, underhood mounting and transparent, quick-dump collector greatly simplify servicing. International even provides a dash indicator that shows red when element needs servicing!



Prove new "15's" undercarriage strength!

To go along with precision-welded double-box-beam TD-15 track frames is the added strength of drum-type front idlers — the added protection of frame-welded track chain guides — the added service life of self-cleaning, power-saving strutless track links. The new "15" is the only crawler of its power class with the shock-load prevention of ball-joint suspension — basic in International's famous 3-point track mounting design! Improved, high-efficiency full-floating seals protect the long life Dura-Rollers — the track rollers you grease *only* once per hundred 10-hr. shifts!



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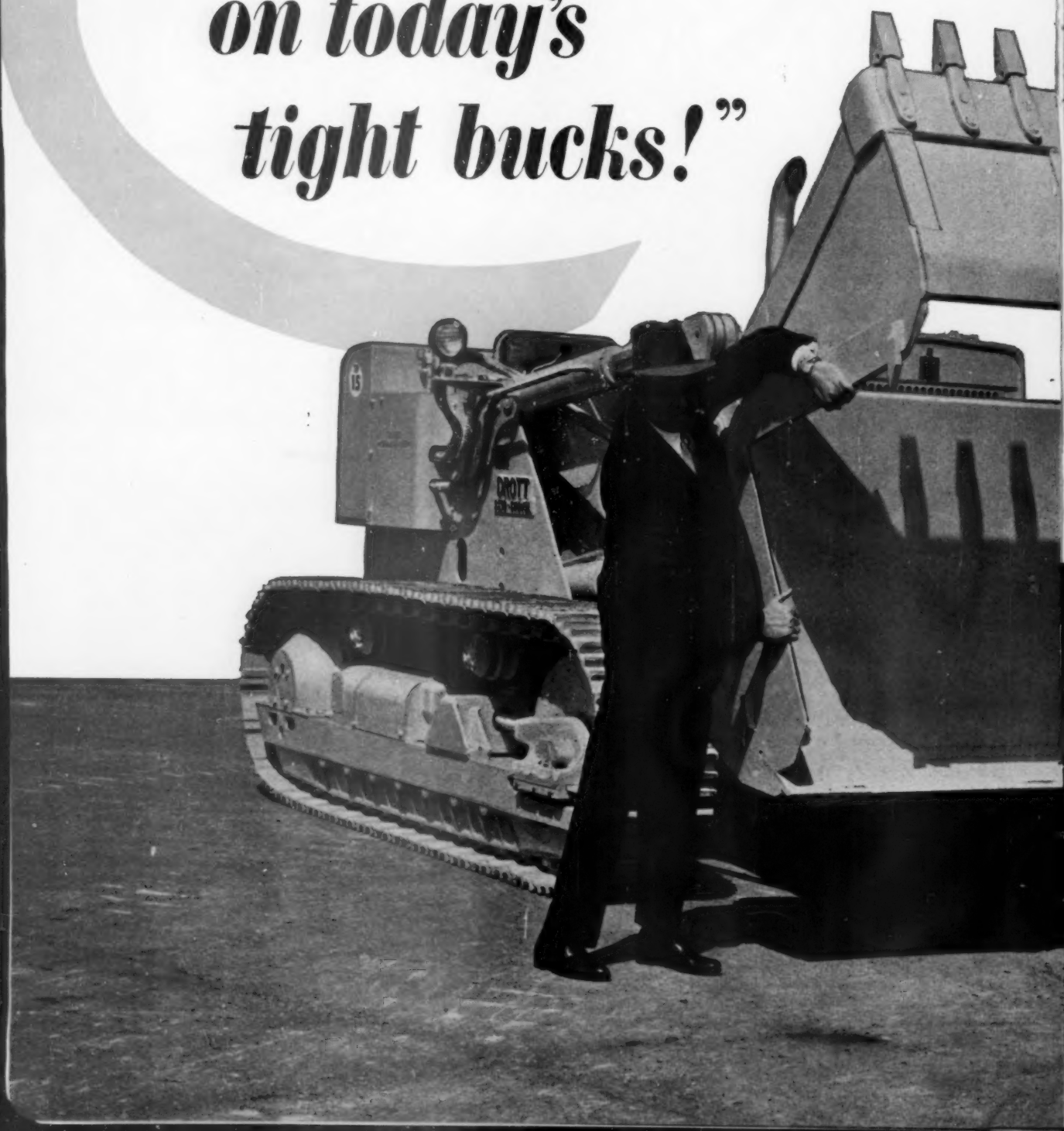
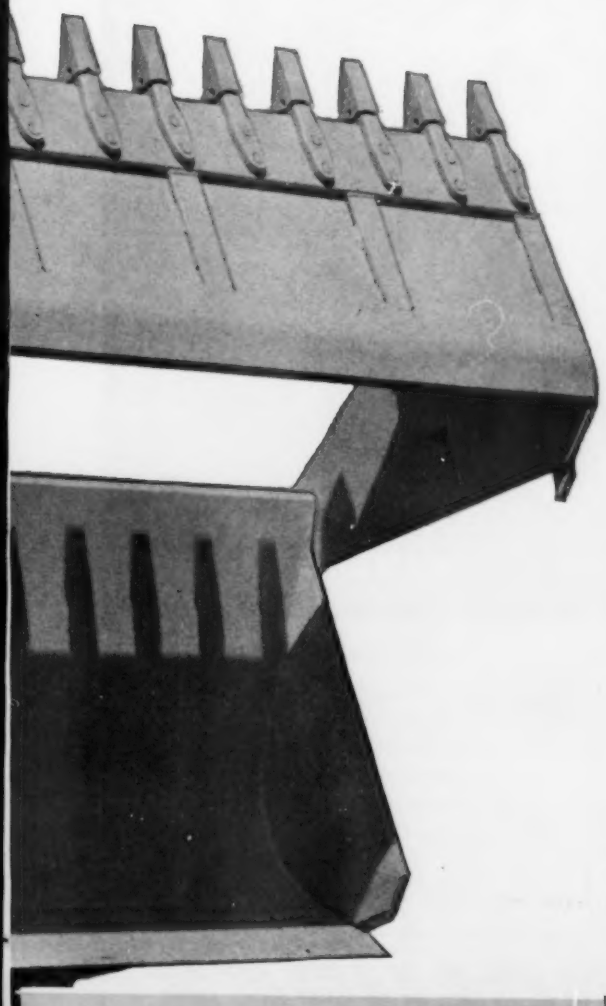
"Mister...it clam-action to 'put the on today's tight bucks!"



takes bite'



"15 minutes on this new '15' Four-in-One will prove you can't afford to own any limited-duty bucket!"

"Sure, a racehorse loader with a 'lock-jawed' bucket may gain you a few minutes a day—just dipping from a stockpile and dumping in a truck!

"But anywhere else we double-challenge you to stack any limited-duty loader against a new '15' clam-action 4-in-1, and see what happens. We can tell you right now what'll happen no matter what size, shape or color the single-action rig is, or how shifty it is! It'll get clobbered! And, profitwise, so will the guy who buys the obsolete bucket without bothering to find out what a slew of jobs the new '15' Four-in-One does.

"You can get the straight dope, first hand in 15 minutes, on this new TD-15 Four-in-One. In just one quarter-hour, you can prove what it means to own the one and only machine that doubles for a whole spread of contracting equipment—at the touch of a hydraulic lever.

"In only 15 minutes, you can put the 'bucket with the bite' through its paces. Prove how you get four, or a dozen, or more, full-sized, full-capacity machine actions with the exclusive 4-in-1. Prove you get hundreds of job-handling working positions with each action.

"See how new TD-15 Four-in-One get-up-and-go is tailored to set a fast work pace, with the single-stick shift, full-reverse transmission, and plenty of hydraulic control power.

"C'mon in now—take 15 minutes on a new '15' Four-in-One. Or call us for a demonstration on your job. See for yourself why you can't afford to own any obsolete 'lock-jawed' loader."

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL® DROTT

"'Doze, grade, grab, spread, do cut-and-fill work, strip, load sticky materials, outshovel a power shovel, pick up loose materials (without chasing them), grub, load 'impossibles.' Do dozens of other profitable jobs with the new '15' Four-in-One that single-action loaders can't touch."

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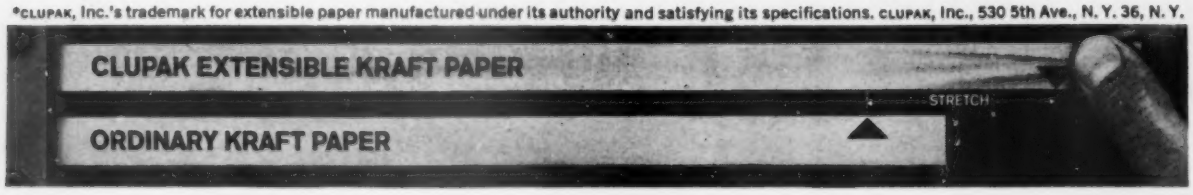
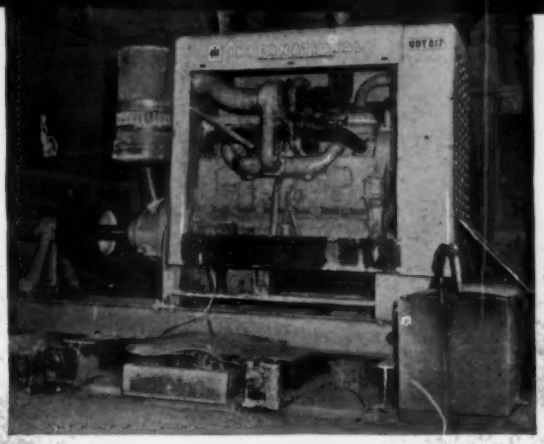
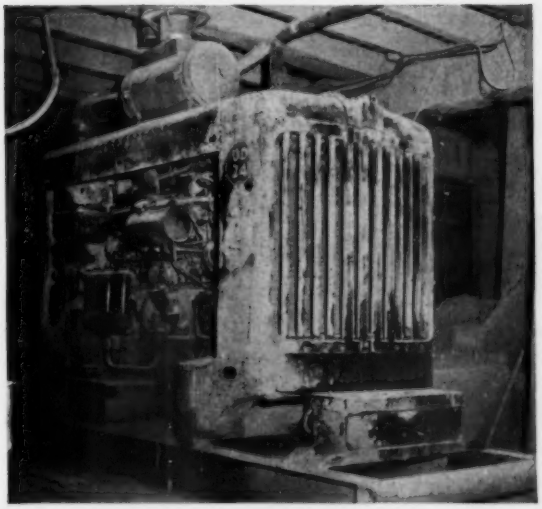




New 375-hp UDT-817 diesel replaced an old International UD-24 when the company stepped up production. "This new 817 gives us plenty of power with an abundant surplus," says Plant Superintendent J. M. Houtz. "It starts easy, has good fuel economy, and carries a constant load with normal temperature."

Durable dust-covered veteran is still in good shape after years of continuous service. "We've been using International engines since 1941," says Mr. Houtz. "We get dependable power with minimum repairs in extremely dusty conditions."



20 YEARS

of dependable power from dust defying International diesels!

The Kentucky-Virginia Stone Co., a leading producer of aggregate and crushed limestone products, solves the dust problem with a simple formula: *Buy International because IH engines are designed to cope with dust!*

Some engines virtually choke to death when abrasive grit reaches internal parts. But International diesels, with 99%-plus air-filtering efficiency, live on clean air, keep dust and grit outside. That's why so many IH diesel owners get long-life, low-repair engine performance on dusty crushing jobs. If your plant "smokes" and covers equipment with abrasive powder, it will pay you to investigate clean-breathing, perfectly sealed International engines!

There are 35 diesel and carbureted models in the IH line, from 16.8 to 385 max. hp, stripped engines to complete power units. Your nearby International Engine Distributor or Dealer will be glad to give you full product information, and installation assistance when you need it. Call him soon!

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IH ENGINES

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"Its simplicity sold us"

"When we buy pit equipment, we put clean design and simple maintenance at the top of the list. We know from experience that the most *trouble-free* machine is the one that's *most profitable* for us. That's why 3 of our 4 cranes are now AMERICANS." So says Art Hintz, who manages Waukesha Block Co., Inc., of Waukesha, Wis.

And he's right. Take their 500 Series excavator shown here . . . rugged, accessible, completely modern. Standard anti-friction bearings at all important points. Grouped, easily accessible lube points. Outboard bearings for rigid shaft support. Dependable, easy-to-operate graduated air controls.

Investigate AMERICAN, the all-modern crane that knows how to take care of itself!

CC-741

SHOVELS ½ TO 4½ YDS

CLAMSHELLS—DRAGLINES

AMERICAN

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and DERRICK COMPANY
ST. PAUL 7, MINNESOTA

USS Grinding Balls are delivered fast!

No delivery problems. We don't actually throw grinding balls at our customers—but you can call the shots and we'll ship them fast—all the balls you need, exactly when and where you need them.

No selection problems. You can order from a complete stock of USS Carbon-Manganese and USS Alloy Steel Balls, in ten sizes ranging from ¾" to 4".

No performance problems. USS Grinding Balls are hard, tough, and uniform from ball to ball and load to load. Recently completed hardness surveys under direction and control of USS Research Center proved that maximum depth of hardness consistent with toughness is provided by our product in both carbon and alloy grades in all sizes. You cannot buy a better ball for your purpose!

Solve your grinding ball wear problem by calling our nearest Sales Office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

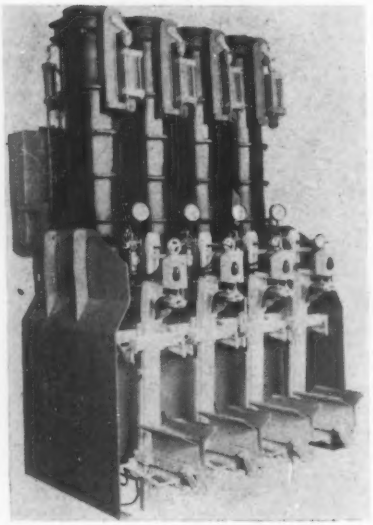
United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal & Iron Division • United States Steel Export Company

This mark tells you a product is made of modern, dependable Steel.

United States Steel USS

TRADEMARK

new machinery



● A multiwall valve bag packer, the "Force Flow," available from St. Regis Paper Company, handles a wide range of powdered and free-flowing materials such as cement, plaster, carbon black, and lime.

A pressure chamber "densifies" materials so that they can be packed faster in a more tightly filled bag. This results in a higher production output, greater packaging economies, and, for many products, a reduction in bag size.

The machine is easily adjustable for quick changeover to different products and different bag sizes. It can handle 25- to 100-lb. sewn or pasted valve bags, and is available in one- to four-tube models. Up to 28 bags per minute can be packaged on a four-tube model.

Three features that provide a clean filling operation are: (1) expandable rubber sleeve on the filling tube which seals off the valve of the bag during filling; (2) an automatic time delay in the filling cycle; and (3) controlled venting of each bag after filling.

Weight accuracy is within plus-or-minus four ounces on most products. A poise weight control within easy reach of the operator simplifies weight adjustment.

The packer is completely pneumatic, and, as the packer has no electrical components, it is explosion proof. With no rotating parts, and few moving parts, maintenance costs are low. **(350)**

● A valveless welding torch, Style 725, suitable for production welding and brazing operations is available from Air Reduction Sales Company.

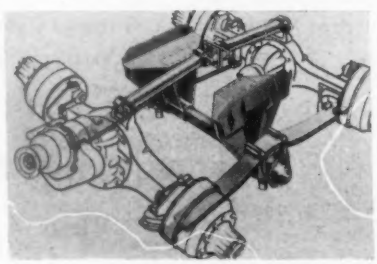
The feature is a centralized control system which affords economy in gas consumption and reduced operator fatigue. Needle valves have been eliminated from the torch assembly. A "gas-mizer" is used in conjunction with the modified torch, and flame adjustment is made at the regulators on the gas cylinder or pipeline station. The gas-mizer, located between the gas supply and the torch, closes off the fuel mixture whenever the torch is hung on the hanger arm hook. When the torch is picked up, the flow of gas is started again. The gas-mizer, which can be equipped with or without needle valves, has a pilot light to ignite the torch. **(351)**

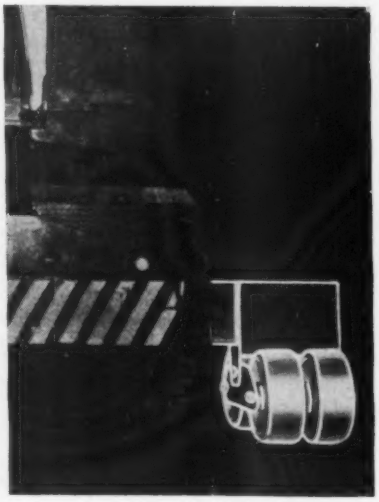
● Minimum weight suspension and the rideability that is the result of long-leaf springs are two features of the "Taper-Leaf" tandem suspension system developed by Rockwell-Standard Corporation.

Trucks equipped with this suspension are reported to carry up to 434 lb. more payload affording a more comfortable ride.

Each spring consists of two leaves of equal length. The thickness at the center is increased to the point where the section modulus, or bending strength, is equal to that of a multi-leaf spring. Each leaf then tapers gradually towards the ends, keeping the same strength as a multi-leaf spring. In this way the same load-carrying capacity is achieved with two leaves as with standard suspensions carrying multiple leaves —and with savings in weight.

The drive load is transmitted through the slotted springs, assembled over removable eccentric blocks located on pins in the housing brackets. No rubber mountings are needed, and quick parallel adjustment and easy removal of axles is achieved. Spring leaves are supported, and free to "rock" without twisting if an axle passes over an obstruction. **(352)**



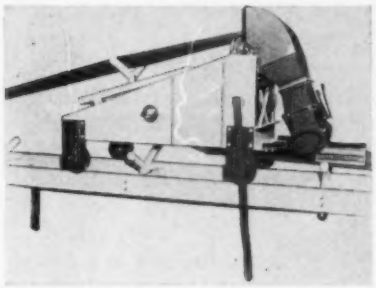


● A mobile outrigger attachment, called "Rolling Outriggers," has been developed by Crane Products Manufacturing Company for all makes, models, and sizes of truck cranes.

The outriggers, with a capacity up to 25 tons, can be attached to the front or rear outrigger beams of a crane in three minutes. The device reportedly boosts walking loads up 400 percent while providing greater speed and safety. **(353)**

and equipment

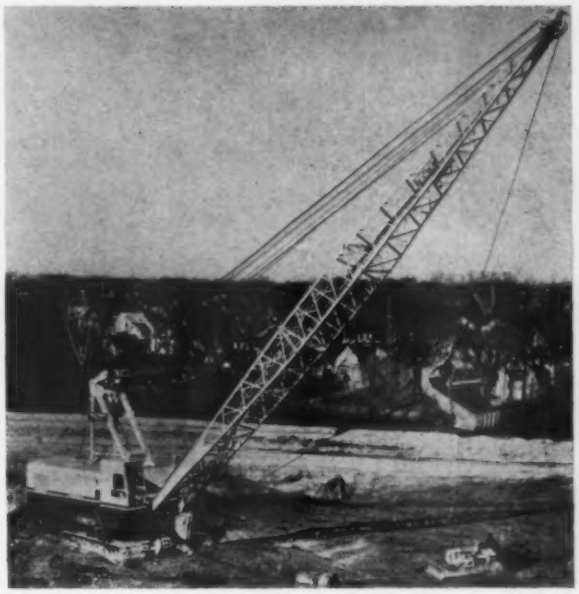
for further information use card on page 241



● A belt propelled tripper with a capacity, when using dual roll idlers (rabbit ears), of 265 t.p.h. (material 100 lb./cu. ft.) at 300 f.p.m. is available from Finco, inc.

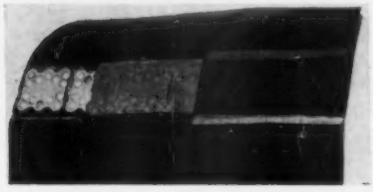
The completely reversible unit weighs 762 lb. and accommodates belt sizes from 12 to 24 in. It can spot the conveyed commodity at any point in a given material handling system. The manufacturer has many discharge arrangements available, including the 3-way spout shown. The tripper can be set for automatic stockpiling. **(354)**

● A diesel-electric dragline and clamshell, Model 210-B, has been added to the line of heavy-duty crawler excavators from Bucyrus-Erie Co. The machine, with boom lengths of 100, 120, and 140 ft., can handle buckets up to 10 cu. yd.



A feature is the elimination of friction clutches for all cyclic functions. Hoist and drag or holding and closing motions are regulated by a static type control of independent electric eddy current clutches, which are liquid cooled by a radiator system. The swing motion is controlled by a variable Ward Leonard system.

Three sets of crawlers are available—standard, intermediate, and long-wide for soft ground conditions. **(356)**



● Rubber covered belts can be given moistureproof splicing mechanically in 1½ hr. with kits and accompanying instructions from The Crescent Fastener Company, Inc.

Illustrated are the three steps needed to effect a splice: (1) Crescent plates are attached after the removal of the rubber cover; (2) rubber filler stock is placed over the Crescent plates; and (3) the rubber patch-covering plates and filler are cold vulcanized to the belt surface by a patented process.

The result is a joint that prevents fabric rot due to moisture, a cleaner scraper operation, and the elimination of wear on idler rollers. **(355)**

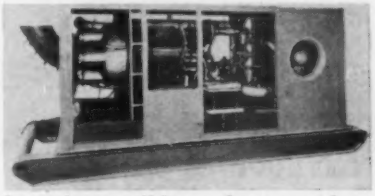
● Three types of gas turbines in 35 to 850 hp. range, manufactured by AiResearch Manufacturing Company, a division of The Garrett Corporation, are being packaged by Mission Manufacturing Company.

One type supplies energy in the form of compressed air. Another, in the form of shaft power. The third type provides shaft horsepower and compressed air simultaneously, or either form of power independently and interchangeably.

The new industrial designs reportedly afford fuel economy competitive with conventional power, and have longer operating life and lower cost.

A fully automatic control system sequences starter operation, fuel control, and ignition, and requires only a single starter switch.

According to the manufacturer, the units start dependably and quick-



ly under conditions of extreme heat or cold, heavy dust or sand. Peak efficiency is obtained in seconds. They can furnish heat at 10,000 to 100,000 B.t.u. per min. in free flowing air up to 950 deg. F., or compressed air from 90 to 500 deg. F. The units also are said to provide compressed air at 30 to 350 p.s.i.g., with 10 percent of conventional equipment weight.

The basic package consists of the gas turbine compressor and power unit mounted on a skid and enclosed against the weather, and includes heat exchanger, operating controls, and safety devices. **(357)**

MANY EXTRA Benefits

. . . in SOME wire cloth specifications

If you use screens of .080 wire diameter or smaller in your screening operations, you should know that we spot weld edges through the cloth on 6" centers. This provides uniform tensioning, which increases screening efficiency and at the same time prevents "pull-out", flexing and subsequent fatigue failure. This benefit is not an "extra".
It is standard practice in HOYT wire screens.

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No matter what the wire diameter of the screens you use, you'll get many extra benefits if you specify HOYT SUPERTOUGH . . . the oil tempered wire screens. Take longer wear, for example. Users tell us they get 20% to 200% more wear from HOYT SUPERTOUGH . . . as compared to spring grade wire. Added benefits include savings on down time and screen changes. Let a HOYT representative tell you about other extra benefits you get without extra charge in HOYT wire screens.

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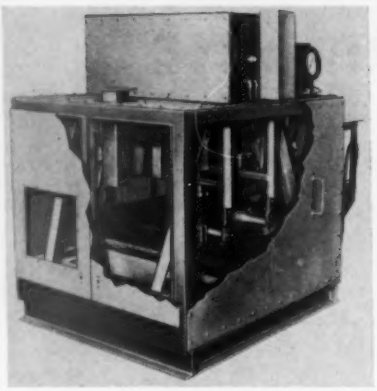
Enter 56 on card, page 241



● A continuous weigh feeder which automatically maintains a preset feed rate of ½ to 50 t.p.h. has been developed by Thayer Scale Corporation.

The system, the CM12, consists of a feeder, conveyor belt, and Thayer flexure plate scale. The belt and its structural components, designed to prevent dust and material accumulation, are completely suspended from the scale. Several feeder types are available, depending upon the material handled. The rotary feeder illustrated is for powdered materials that tend to aerate and flood. Coarse materials are usually best fed by vibrating types.

A separate control box contains all necessary instrumentation for completely automatic operation. The system can regulate ratio type controller and yield accurate and automatic proportioning of several ingredients to a process flow. Weight setting controls at the scale housing permit instant selection of a wide range of flow rates, while a totalizer indicates pounds (or tons) per hour and the summation of a day's run.

The system is enclosed in a dust-tight housing with a dust collection vent.

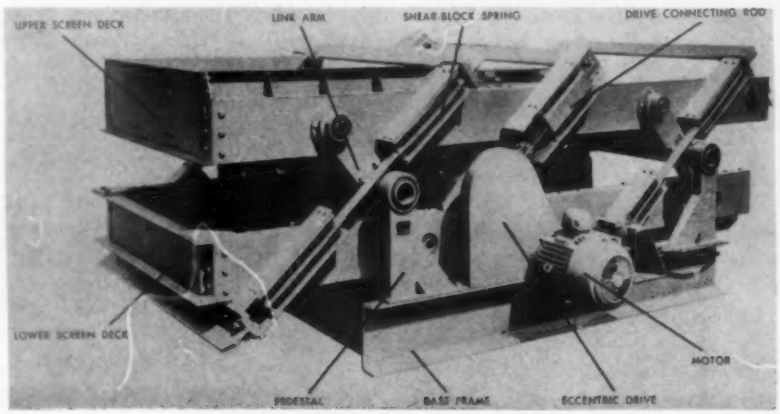
However, the scale mechanism is reportedly impervious to dust, dirt, shock, and vibration because flexure plates are used instead of conventional knife-edge pivots. According to the manufacturer this results in no wearing parts, and accuracy is maintained indefinitely. **(358)**

● A horizontal vibratory screen, with features available in no other make, has been introduced by the COMCO Corporation.

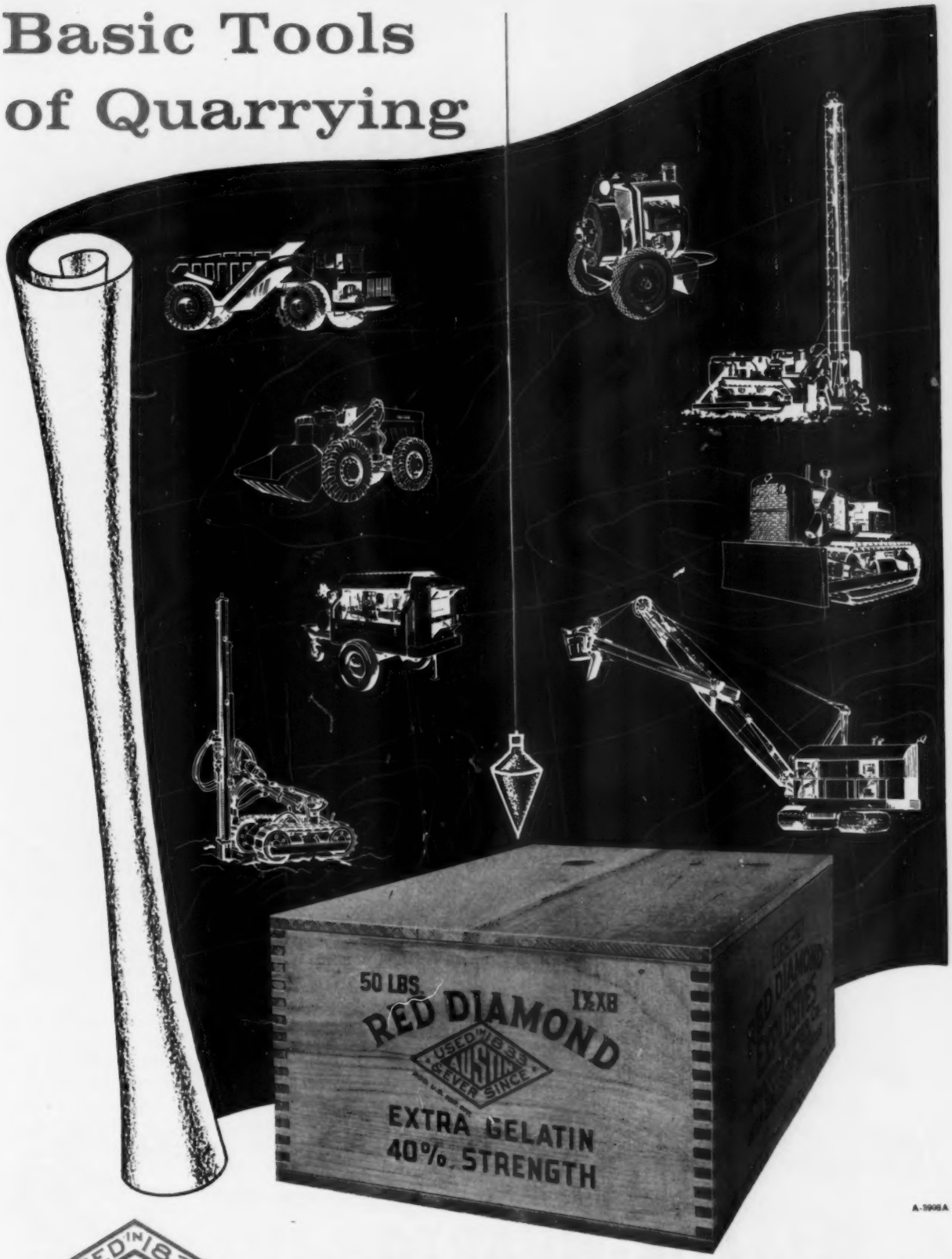
The screening (or conveying) decks are balanced against each other in a balanced-mass design, thus eliminating all dead-weight counterbalances. Another exclusive feature is the "point-of-NO-oscillation" suspension. The screen decks are supported on the base exactly in their center of oscillation—a point of zero oscillation—and therefore transmit no vibration to the base frame. Dampeners are not required, and the screens do not need any special supporting structures.

Shear block drive springs keep the screen decks oscillating one against the other, alternately storing and releasing energy in a natural rhythm that requires little additional power from the motor.

The positive eccentric drive provides a linear oscillation that conveys materials uniformly across the screen without sliding. Also self-adjusting, the drive continues its full-stroke action regardless of load. A unique drive-connecting rod transmits the power from the motor gradually, constantly adjusting to the needs of the screen. **(359)**



Basic Tools of Quarrying



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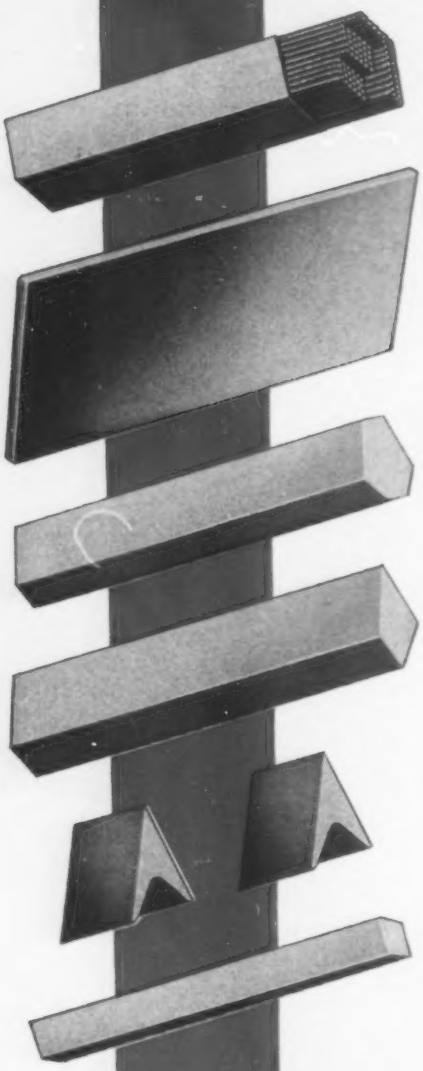

◀ **WELDING RODS** — TIMANG-NICKEL MANGANESE for build-up, joining and repair of manganese steel. Has same manganese content, work harden-ability and wear resistance as cast manganese.

TIMALLOY composite type rod for joining manganese and carbon steel. Also an excellent rod for build-up and repair of manganese castings.

◀ **HOT ROLLED PLATES** — TIMANG-NICKEL MANGANESE for chute liners, dump truck beds, rock and ore hauling trailer bottoms, dragline buckets, rebuilding power dippers, and fabricating new parts. Plates supplied as rolled (not annealed).

◀ **SPECIAL SHAPES** — HOT ROLLED TRACTOR GROUSER BARS for repair of tractor treads. Timang bars in mill lengths up to 20 feet. High carbon bars in lengths of 10 feet — cut to size required.

◀ **WEDGE BARS** — For shovel tooth build-up. The hot-rolled manganese-nickel steel bars can be supplied in mill lengths up to 20 feet, but normally are furnished in 36 inch lengths.

◀ **TOOTH REPOINTERS** — Weld on cast manganese or alloy steel repointers for rebuilding worn dipper teeth — various shapes and sizes available on request.

◀ **APPLICATOR BARS** — Hot rolled rounds, squares, and flats available in mill lengths up to 20 feet or cut to required length.

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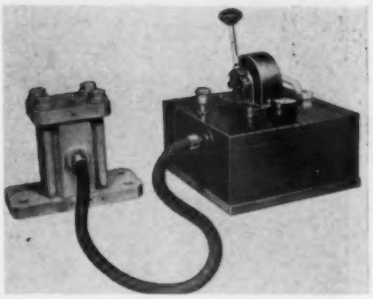


● Two new pneumatic vibrators (1¼ and 3 in.) and an impact-frequency adapter are available from The Branford Company.

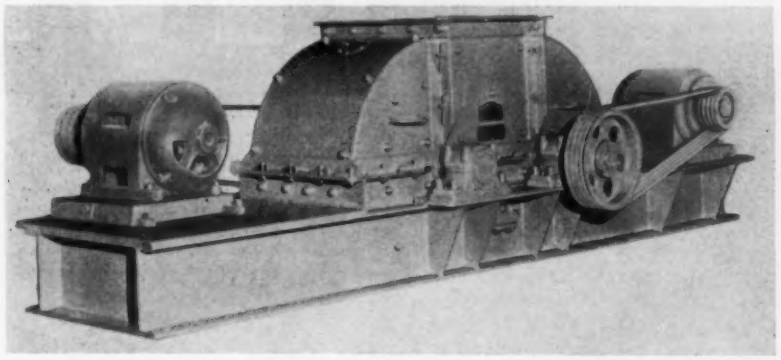
Reportedly for the first time, and with a standard package, the adapter gives full range control of the vibrator's frequency, as well as impact control.

According to the manufacturer, close control of input compressed air allows the vibrator to be adapted to efficient vibrations for flow of materials or control of equipment on which the vibrator is used. Light weight and small size allow portability, and the unit can be mounted on a flat surface. (360)

● A portable fabric tank suitable for such uses as field fueling has been announced by the Goodyear Tire & Rubber Company.

These "Utility Tanks," in eight sizes, range in capacity from 60 to 350 gal. They are made of finely woven nylon, impregnated with a specially compounded rubber. The 350-gal. tank weighs 50 lb. when empty and can be handled by one

man. The one-piece unit is suitable for both static storage and transportation of liquids. The rubber coating is resistant to fuel oil, gasoline, etc. The units are an extension of the principle of "Pillow Tanks." (361)



● The twin-rotor impactor offered by the Pennsylvania Crusher Division of Bath Iron Works Corp. reportedly eliminates the problems of plugging and caking normally associated with the fine reduction of wet and sticky materials.

First, there are no cage bars or grates to plug. Crushing to the desired product fines is by impact only.

Secondly, the wear liners of the impactor are offset from the frame, so that gas torches can be played into the spaces between the liners and the frame. Wet materials will not adhere to the hot liners so that it is not necessary to shut the unit down to scrape off caked materials.

The crusher is offered in two sizes for rated capacities to 100 t.p.h., when used as a secondary crusher in closed circuit to produce 100 percent minus 8-mesh product. Power requirements vary but run as low as 25 horsepower per rotor. As the impactor does not vibrate when running it does not require heavy concrete foundations.

It serves best as a secondary crusher for wet clays or shale, but it also is used as a primary crusher and a tailings reducer. Maximum feed size is eight inches. (362)

POKER? Play to win!

How would you play this hand?

Raise? If your 3-of-kind are nines or lower, yes. Four times in five your hand will be high before the draw, but protect it. If the 3-of-kind are tens or better, don't raise until after the draw. You want customers.

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Sherman C-8 Bobcat power digger—master of the bell hole.

From one quick-set tractor position, the Bobcat digs clean, straight-sided bell holes faster and cheaper than any other unit on the market. Close-coupled to tractor, excellent for work in close quarters.

The Bobcat's a master of the small hole, too. Digs 5 feet deep with a surface opening as small as 48" in length. Get all the details from your Ford Tractor Dealer, or write:

Tractor and Implement Division
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Ford
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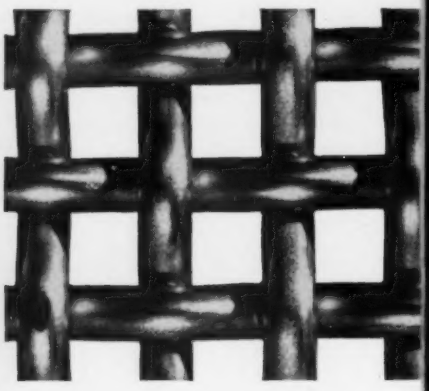
FABRICATED SCREEN SECTIONS TO FIT EVERY VIBRATING SCREEN MADE

Tyler fabricates screen sections to fit every existing type of vibrating screen. This aggregate cloth is drawn from inventory, quickly fabricated to give you fast delivery. Tyler-developed hook strips maintain drum-head tension for long service life.



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Tyler offers a selection of mesh designs and abrasion resistant alloys to match the requirements of any application in mining and aggregate industries. Check Tyler for technical recommendations.

Wire cloth so finely woven it screens out light!

Openings in this woven wire cloth are so tiny they're specified in microns—millionths of an inch. This is Tyler stainless steel wire cloth, 325 x 2300 mesh, used in filtering fuel in aircraft engines. Whatever your special needs in wire cloth, Tyler can supply you from the world's broadest line—covering thousands of different specifications.

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Dependable

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As an aftermath of southern Ohio's disastrous 1913 floods, a series of dams and water control districts were built to guard against a recurrence. To hydraulically transport the millions of tons of earth and rock for this project, Armco developed a special Steel Dredge Pipe. The result? "Surprisingly low material handling costs," according to flood control authorities.

Today, Armco Steel Dredge Pipe continues to provide superior abrasion resistance. In addition, Armco Sales Engineers work closely with operators in the selection of an economical wall thickness for specific jobs. To further help cut costs, Armco offers dredge pipe with carefully fabricated ends prepared for every commonly used field joint. Just tell us what you want, where you want it, and your dredge pipe arrives ready to install.

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ARMCO Drainage & Metal Products

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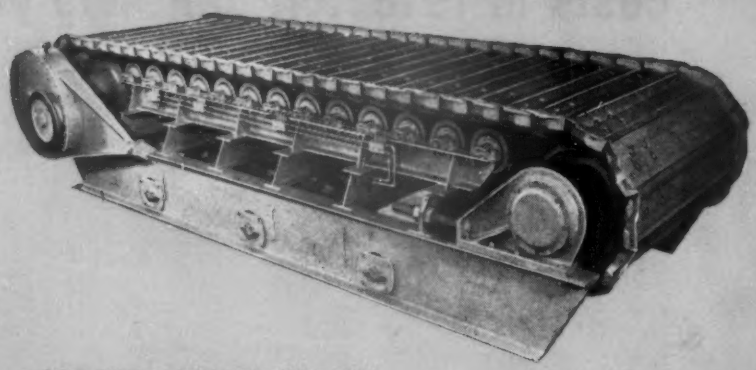

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Between multi-ton loads and rubble-strewn haulroads, it takes tough tires to keep quarry operations moving. That's why you need the extra stamina built into the Firestone Rock Grip Deep Tread. Firestone Rubber-X, the longest-wearing rubber ever used in Firestones, is specially compounded to resist rock and shale cuts. And Firestone's Shock-Fortified nylon cord takes jarring body blows in stride. Match Firestones to all your hard-running equipment. They're backed by swift, on-the-spot service. See your Firestone Dealer or Store.

Always Specify Firestone Tires When Ordering New Equipment.

Firestone

FIRST IN OFF-THE-HIGHWAY TIRE NEEDS

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● An asphalt plant, Model L-201, being offered by White Manufacturing Company, reportedly has big plant features and low cost.

Some of these features are: exclusive parallel flow dryer, hot elevator, 5-ton hot storage bin, air-operated gates, and a batching tower with 1,000 lb. mixer.

The plant, engineered for the private and commercial paver, is rated at 25 to 30 t.p.h. hot mix. Aggregate mixes can be quickly and easily changed, making it possible to run base material and then switch to top material with minimum loss of time.

Accessories include meter, dust collector, aggregate and asphalt scales, and heating system. **(363)**

● High-tensile steel has been used extensively throughout the body frame of the new truck, Model 32S, announced by KW-DART Truck Co., to reduce parasitic weight.

The truck will deliver 32 tons of payload on a short, maneuverable wheelbase. Tires are 18.00 x 25-24 ply all-around. Engine is Cummins V8-350, 350-hp. diesel. The unit-mounted, heavy-duty transmission provides 10 speeds forward and two reverse. Torque converter is optional. The net empty weight of the truck is 44,675 lb. **(364)**

See technical literature offered on page 241.

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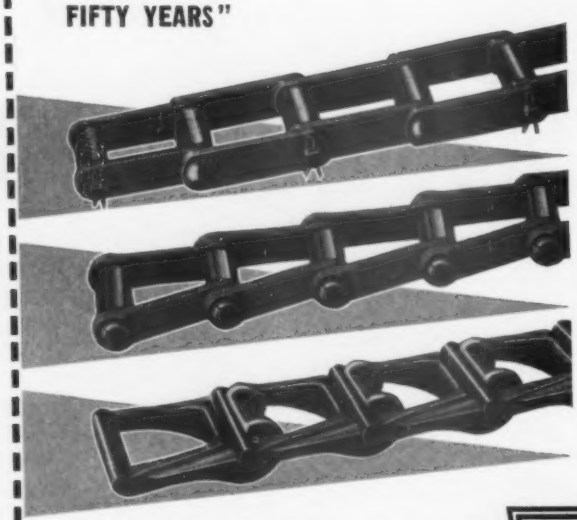
"FOUNDRYMEN FOR OVER FIFTY YEARS"



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Finest Name in Cast Steel!

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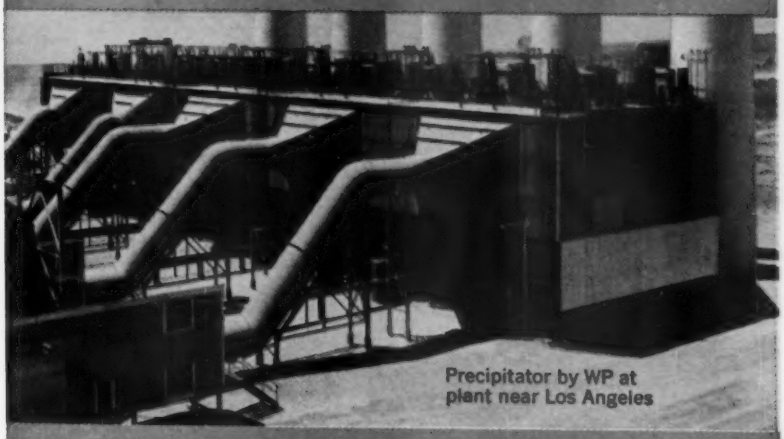
Therm-O-Flex filter by WP at plant in Barberton

Cement makers in Ohio... and in California...agree:



Precipitator by WP at plant near Los Angeles

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For an efficient, economical solution to any dust control problem—look to Western Precipitation. WP is uniquely fitted to handle your unique problem—being the one organization that custom designs, engineers and installs ALL types of dust and fume control equipment: Precipitator, Mechanical, Jet-Cleaned Filter, Hi-Temp Filter, scrubbers and engineered combinations.

With no axes to grind for any one system, WP engineers will give your job a completely unbiased recommendation—whether it's a quote on your specifications, a single component, or a completely engineered installation . . . small, major, simple, or complex.

An inquiry—on your business letterhead—will bring you literature promptly. Just write Western Precipitation, 1000 W. 9th St., Los Angeles 54, Calif. (In Canada, write 8285 Mountain Sights Ave., Montreal, P.Q.)

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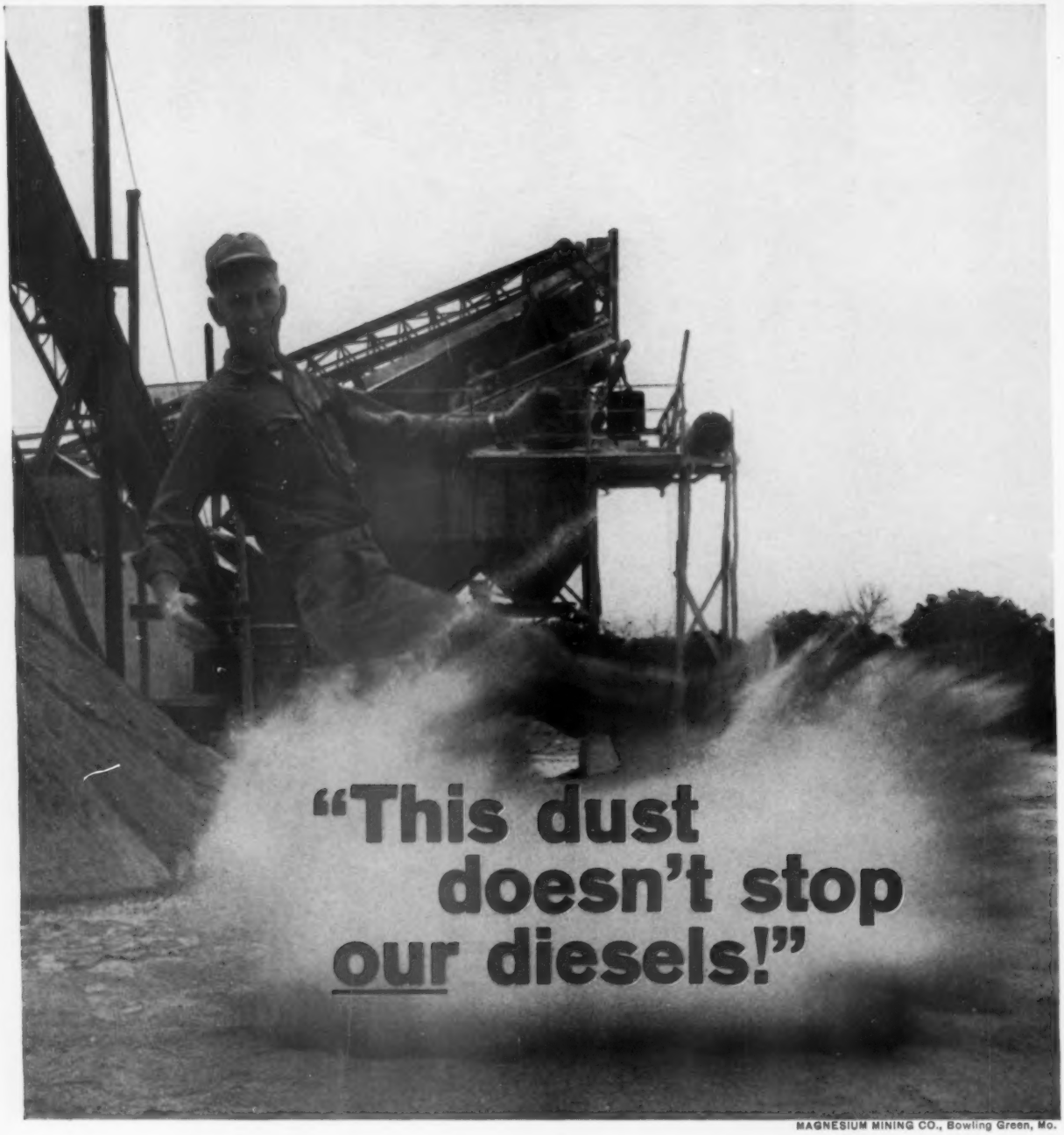

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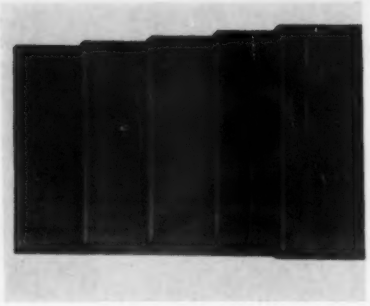
CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



● The "Black Giant" belt manufactured by Corns Conveyor Belt Co., is reported to be particularly suited to conveying crushed stone, sand, and gravel, because of its high resistance to abrasive material.

It is virtually one belt within another, double stitched for strength and lasting quality. The inner plies are sewed separately, after which the outer belt is attached, with a seam in the center, producing a belt with two round edges.

The unique feature, according to the manufacturer, is the compound with which it is treated. It is a combination of gums which do not soak into the belt, but which are forced in by a mechanical process. This forces the compound into the belt while under tension and, once set, the belt reportedly does not go back. Pliability is retained because the compound does not harden. This gives the belting traction power, permitting looser running without slippage. A smoother surface than conventional belting is presented to the face of the pulley. (365)

● A conveyor belt that automatically twists itself, reversing top and bottom surfaces of the belt, has been developed by B. F. Goodrich Industrial Products Company.

The turnover system prevents build-up of sticky materials on idlers or pulleys. In one application the system transports 800 t.p.h. over a 4½-mile course. The equipment was installed on existing belts, with the twisting action accomplished by placing two twist pulleys at each end of the belt flight. To keep its clean side on top of the return idlers, the 4,480-ft. belt delivers its load, then makes a 180-deg. twist to present a clean face to the idlers, returns to the loading point, and makes another 180-deg. twist before accepting the new load. The belt's thick carrying cover is always positioned to receive the load.

The turnover system can be applied to any conventional system now in operation, without altering the framework. Necessary space for mounting turnover pulleys and accommodating the belt turn is all that is required. The system is recommended for use wherever a conveyor belt handles moist, wet, or sticky materials, such as shale or wet sand.

Wet material reportedly can be handled at low temperatures with no danger of the belt freezing to the pulleys and idlers. (366)

Ag-lime FINES bring more money.

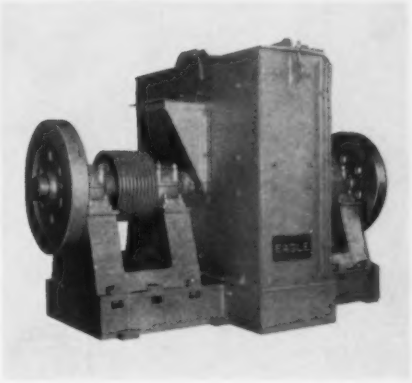
EAGLE CAGE MILLS produce more fines.

Yes, you can make more money if you are in a position to produce fine grades of ag-lime. Farming today is a science and the scientists have discovered that the farmer can make more money with the use of finer ag-lime . . . simply because it is absorbed faster.

Fine particle reduction of hundreds of materials is handled with ease by the distinguished line of multi-cage disintegrating mills as engineered and made by Eagle Crusher Company.

Eagle Cage Mills are sold all over the world because they are real money makers, require very low maintenance, have big capacity (10 to 70 tons), have one-piece, electrically welded frame, high quality taper-bore bearings . . . and they have easy access to working parts.

Coarse grades of ag-lime take longer to reach the plant's feeder root zone and are less desirable. Fine grades of ag-lime bring almost twice the market price and are in great demand.



A single pass four-row cage mill by Eagle Crusher Company with its high-speed impact, and disintegrating action using hard-faced bars produces finer aggregate . . . and increases tonnage! This single pass Eagle design produces superior quality ag-lime at an average rate of 30 tons per hour, subject to variations in raw materials and weather conditions.

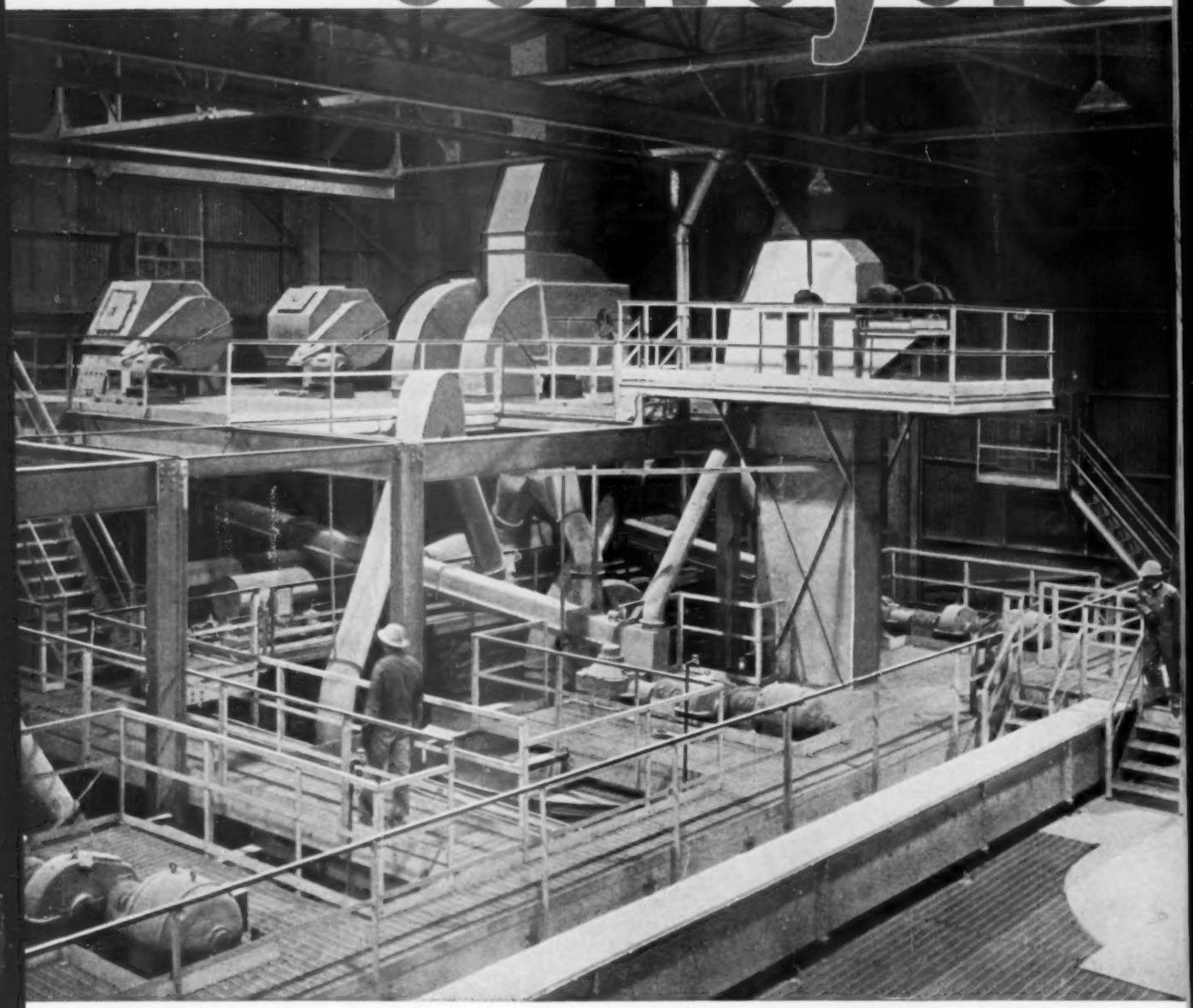
Write today for free booklet titled:
Make More Money with Eagle Disintegrating Mills.

JAW AND ROLL CRUSHERS, PORTABLE PLANTS, CAGE AND HAMMERMILLS, CONVEYORS, LOADERS

EAGLE CRUSHER CO., Inc. GALION OHIO-U·S·A

Enter 67 on card, page 241

LINK-BELT conveyors



BUCKET ELEVATORS—Unlimited solutions to vertical or inclined movement of a wide variety of materials—bulk or parts. Fourteen types in four basic designs are fabricated from Link-Belt designed and integrated components—factory aligned for low-cost installation, smooth performance.

The last word in value from the first name in conveyors

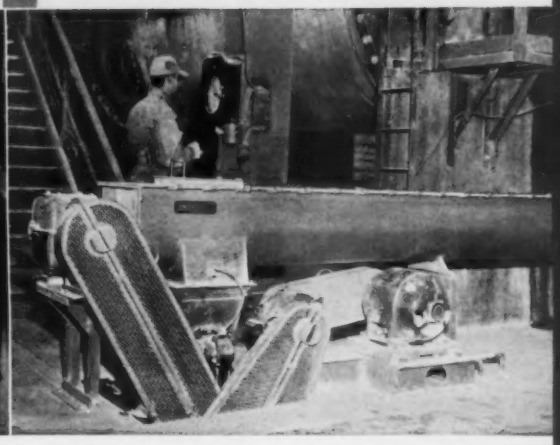
When it comes to your materials handling needs, it is a matter of sound economics to depend on Link-Belt, builders of industry's most complete conveyor line. In addition to this broad range of line, which permits unbiased recommendations, Link-Belt offers *quality*—achieved through engineering skills, manufacturing scope and research . . . *"experience unlimited"* in the materials handling field.

Also important, Link-Belt can provide *complete* handling systems . . . patterned exactly to your requirements with a background of more than 80 years of conveyor specialization. Our engineers are familiar with the particular handling needs of every industry. It's more than likely they have met—and solved—many problems similar to yours. We will design, equip and erect your entire installation . . . and accept full responsibility for its successful operation.

For full information—on single components or complete systems—large or small—contact your nearest Link-Belt office. Catalogs covering all conveyors are available on request.

unlimited

The line that means savings, whether handling raw materials, or finished products

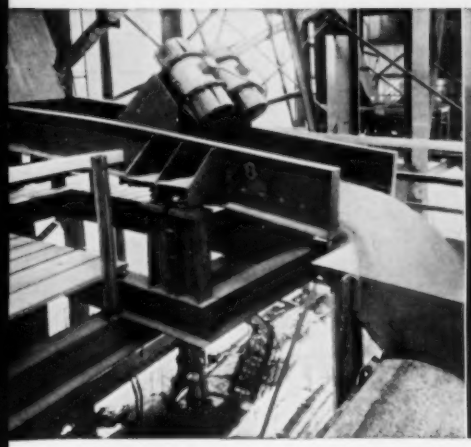


BELT CONVEYORS—Link-Belt serves as a single source for design, equipment and erection of *Job-Engineered* belt conveyors for small or large tonnages, for routes of any length. Link-Belt engineers have the selection advantage of industry's most comprehensive idler line—plus a broad range of pulleys, drives, terminal machinery and auxiliary equipment. Husky, *Pre-Bilt* sectional belt conveyors are also available from Link-Belt.

SCREW CONVEYORS—Operate horizontally, vertically or inclined. Link-Belt provides all components for a complete screw conveyor line. Exclusive optional *Quik-Link* feature permits fast, easy removal of any conveyor section without disturbing other components.

FEEDERS—Types for any capacity, any material. Link-Belt produces industry's broadest feeder line . . . belt, apron, reciprocating, screw, vibratory, bar, gravimetric and rotary types provide a uniform, controlled feed either mechanically, electrically or by weight.

APRON CONVEYORS—Wide application range provides efficient handling of sand, rock, gravel and many other materials. Materials are moved with a minimum of degradation over horizontal or inclined paths, or a combination of both. Jointed, overlapping or interlocking apron pans form the continuous carrying surface. Variety of chains, coordinated with pan design, matches the conveyor to your particular needs.



LINK-BELT

CONVEYING AND ELEVATING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,595

Keeping production on the move in every industry

Apron conveyors
Arm and tray elevators
Belt conveyors
Bucket elevators
Bucket elevators-conveyors
Bulk-Flo
Car-type conveyors
Chain conveyors
Circular carrier conveyors
Drag conveyors
Flight conveyors
Flite-Flow conveyors
Oscillating conveyors
Power-and-free conveyors
Pusher chain conveyors
Scraper conveyors
Screw conveyors
Sidekar-Karrier conveyors
Skip hoists
Slat conveyors
Trolley conveyors
Trukveyors

Enter 68 on card, page 241

NEWS TO HELP YOU UNLOCK MATERIALS FLOW PROBLEMS

with the VIBRAJUST Pneumatic Sledge Hammer!

Ever have your bin clog — or material hang in a chute — or cling to dump or truck bodies — or have a conveyor stopped up, when one or a few dozen solid raps would unlock the problem?

The new VIBRAJUST Pneumatic Sledge Hammer can be attached to your trouble area, and you can give it one whale of a blow—or as many blows per minute (up to 60) as the three-way valve is operated.

Provides these outstanding advantages:

- Operates anywhere there is an air system: 4 to 80 psi line pressure. Low air consumption. Weight is 31 lbs.
- Can be controlled remotely with a solenoid valve locked in, sequenced, or timed in.
- Air spring allows operation in any plane
- Impact amplitude is adjustable
- Maintenance-free air passages that do not plug
- Maintenance-free bolts do not loosen or stretch
- All steel construction with O-Ring static seals
- Available in an absolutely dust-proof model
- Non-lubrication feature can be ordered

Write today for new VIBRAJUST Sledge Hammer Bulletin No. 80. Other VIBRAJUST products: Vibrators, Impact-Frequency Adapters, Variable Impact Vibrators.

VIBRAJUST BRANFORD PNEUMATICS

THE BRANFORD COMPANY

131 Glen Street • New Britain, Conn.

Enter 70 on card, page 241

Washington News Letter

(*Concluded from page 11*)

the first or early years.

To explain the reasons for the opposition requires more than just the simple conclusion that businessmen prefer their formula to that proposed by the government. There is an underlying feeling that this proposal is an attempt to use tax relief as a method for getting businessmen to behave in a particular manner, that is, getting them to do something which the government wants them to do but not something which they, themselves, regard to be in their own best interests.

This opinion generates a fear that if the government accomplishes this objective, it will eliminate one of the few remaining areas in which the businessman still has a large degree of freedom of choice, namely, the rate at which he will expand and operate his business.

Administration officials who have been rebuffed refuse to recognize this problem. Their explanation is simpler. They indicate that the business community has turned them down because they think they can get a greater cut in taxes if they wait just a little longer. Almost in retaliation, they are threatening the business community with "It's this or nothing!"

Nevertheless, compromise proposals are already beginning to be heard. A few trial ballons have been sent up. It now appears unlikely that anything will happen with this proposal in the current session of Congress. The final chapter will not be written till next year.

It has been announced that the Riverton Lime and Stone Company, Riverton, Va., a division of Chadbourn Gotham, Inc., has been sold to a group headed by this division's present management. It was indicated that the price was approximately $2 million in cash and securities.

Grand River Limestone Company, which has a plant at Grand River, Iowa, has been sold to a division of the E. I. Sargent Quarries, Des Moines.

Enter 71 on card, page 241 →

30 YEARS OF SERVICE

and Amsco Dredge Pump is "good as new"

Sand and gravel from the Arkansas River are hard and abrasive. That's why Johnson Sand and Gravel, Larned, Kansas, bought Amsco pumping equipment in 1931.

This *same equipment is still on the job* and owner Willis Eakin says, "After 30 years of dependable, trouble-free service it is still good as new."

Mr. Eakin owns an Amsco Type M 8″ pump with Amsco 90° and 45° elbows and an Amsco Flap Valve. This equipment handles 56,000 to 80,000 tons yearly and during peak seasons often operates 30-40 twenty-four hour days at a time. Material measures as much as 2″ to 3″ in diameter.

Amsco Dredge Pumps aren't "sold off the shelf." Each one is custom engineered to the specific requirements of specific jobs. For example, Amsco "HC-250" Alloy, a special high chromium iron, is used for highly abrasive applications. Amsco Manganese Steel, "The toughest steel known," has no equal where impact is encountered.

Your nearby Amsco Representative can make a free appraisal of your dredging job and recommend Amsco Dredge Pumps, swing sheaves, flap valves, elbows, hose nipples and hand hole nipples for the toughest jobs known. We'll be happy to send you his name or send him around to see you.

1261

AMSCO

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILLINOIS

AMERICAN Brake Shoe COMPANY

Other plants in:
Denver • Los Angeles • New Castle, Delaware
Oakland, California • St. Louis
IN CANADA: Joliette Steel and Manitoba Steel Foundry Divisions
IN MEXICO: Amsco Mexicana, S.A.

AT THE HEART OF INDUSTRY...

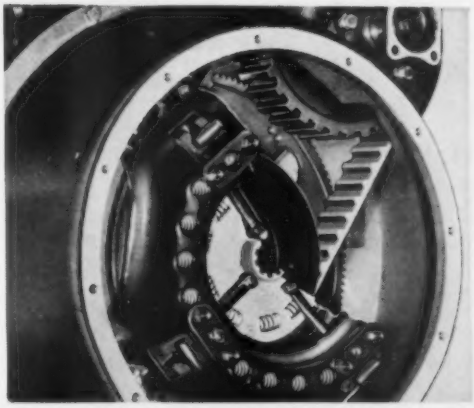
60,000 tons of material a day are being carried by a US Conveyor Belt at New Mexico's Abiquiu Dam, which will be the fourth highest earth-fill dam ever built. More than a mile and a half of specially constructed 48" US Belt, traveling at 800 fpm, is used on this single conveyor. Other, wider US Belts are also being used in this major flood-control project to carry the more than 15,000,000 tons of fill required. Conveyors were designed and built by The Conveyor Company of Los Angeles in conjunction with US engineers for Mittry Construction Company, general contractors.

CB 118

Wherever the mining or construction industry operates, you'll find U.S. Rubber products adding their "muscle" to the job...making it easier, more efficient, more profitable. As the world's largest producer of Industrial Rubber Products, US knows the needs of mining and construction men everywhere.

6 U.S. Pilot® Pipes pump 5,000 gallons of water per minute at a Minnesota taconite mine. The pipes lead from a barge pump to two concentrators. Rubber pipes were essential, for during pumping the barge may rise or drop 10 feet, straining hose and connections. Despite its flexibility, this pipe is extremely strong . . . takes 250 lbs. pressure.

H 110



The revolutionary new flywheel power take-off on Reo's transit-mix truck relies on a U.S. PowerGrip "Timing" Belt for the positive, smooth, direct, and even-flowing power essential to its success. The "Timing" Belt does away with a separate engine or front-end take-off, eliminates the need for lubricants, allows a payload increase of more than 600 lbs. per trip.

TB 106

Now US brings another major development to conveyor belting—the WeatherGard cover. In recent tests this cover was unharmed by 7 times the ozone torture that causes ordinary belt covers to crack and fail. What's more, the WeatherGard cover has much greater resistance to cracking from accelerated aging, has outstanding resistance to abrasion, wear, and weather.

CB 119

For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION

ADVANCED PLANT DESIGN STANDS 11-YEAR TEST FOR LOW COST PRODUCTION

Half-mile long Barber-Greene belt conveyor system runs on original idlers, cuts handling costs at Elmhurst-Chicago Stone Co. plant

"Our maintenance cost per ton on the Barber-Greene conveyor system has been extremely low for 11 years, and not a single carrier has been replaced," says an Elmhurst-Chicago Stone Co. official. "We have been so satisfied with the operation of our Barbers Corners plant that we've virtually duplicated this layout at our Warrenville plant," he comments.

Hailed as an industry showplace when it started operation 11 years ago, the Barbers Corners truck shipping plant is still a model for low-cost production of sized aggregates.

Today, only two men are required to operate the plant. One directs production of concrete building aggregates, and a second man handles facilities producing asphalt mix aggregates.

Elmhurst-Chicago Stone Co. has been an aggregate producer for 77 years, and is currently operating four plants in the Chicago area.

Get this same lowest-cost-per-ton solution to your material handling problems by calling in your Barber-Greene Conveyor Specialist. He sells pre-engineered standardized conveyors plus 40 years of experience in designing and building specially engineered systems—a preferred combination throughout the industry.

Barber-Greene stackers are used both to fill truck-loading bins and to build stockpiles. All are power-propelled and operated by remote control.

Fully mechanized crushing, washing, and screening plant shows how Barber-Greene belt conveyors move materials through each phase of processing.

Aerial view of Barbers Corners plant shows how six Barber-Greene radial stackers build huge circular stockpiles that allow maximum storage capacity in minimum space.

SEND FOR NEW IDLER BULLETIN

New 44-page Idler Bulletin describes the more than 800 units available in the complete Barber-Greene line, tells how their years-ahead features bring longer life and greater economy to every job. Ask for your copy today.

Your belt conveyor equipment headquarters

Representatives in Principal Cities of the World

Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.
Other Plants: DeKalb, Milwaukee, Detroit, Canada, England, Brazil, Australia

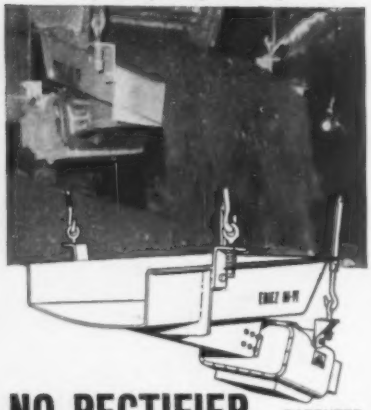
CONVEYORS • LOADERS • DITCHERS

ASPHALT PAVING EQUIPMENT

Enter 74 on card, page 241

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.



NO RECTIFIER NEEDED WITH ERIEZ HEAVY-DUTY VIBRATORY FEEDERS

PATENTED

AC powered Eriez Hi-Vi vibratory feeders move large tonnages of bulk materials with accurate control . . . more efficiently and economically. Illustration shows one of a number of Eriez units available for heavy feeding applications where **big capacity and accuracy** are essential.

Whatever your application, there is an Eriez electro-permanent magnetic feeder that will meet your exact needs. And you get this exclusive combination of advantages: No rectifier needed . . . AC operation. Totally enclosed drive element ideal for hazardous, dusty, wet and corrosive installations. New fibre glass springs assure superior performance and control . . . longer life because spring breakage is practically eliminated.

The full line of Eriez Hi-Vi vibratory feeders includes models with feeding capacities ranging from ounces to many tons per hour.

Write for descriptive bulletin to:

ERIEZ MANUFACTURING CO.
113UA Magnet Drive, Erie, Pa.

MAGNA-THOUGHT

Constant research, development and refinement are the keys to new and improved products. New and improved products are the keys to a company's growth.

A. F. ISRAELSON
Chief Engineer

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

Enter 76-A on card, page 241

Labor Developments

(Concluded from page 13)

to issue directives, and to take any other action the commission may direct. This is the arsenal of weapons with which the commission will fight work stoppages.

The commission is also directed to develop, with the federal contracting agencies and with the parties, programs for obtaining in collective bargaining and other contracts both no-strike and no-lockout provisions and procedures for the expeditious resolution of grievances and other labor problems.

This approach has something old in it and something new. The old is its reliance on a no-strike, no-lockout pledge and an agency with labor and management representatives on it which is charged with the responsibility of keeping labor peace. The new features are the authorization to use such a variety of techniques and establishing of the commission, composed of the regular government agencies which should be concerned with the problem, the Department of Labor, the Federal Mediation and Conciliation Service and the Air Force.

It is fully implied that this is no temporary arrangement but, rather, that the commission will become a permanent part of the machinery. Indeed, if it is successful, we may expect the growth of a number of such permanent commissions, charged with the responsibilitiy for keeping labor peace in a number of critical areas, such as atomic energy installations, other defense facilities, and, perhaps, even some essentially non-military, but nevertheless critical areas, such as the basic steel industry.

What is missing in the set-up of the commission is the assigning of any direct responsibility for keeping costs down. There is some danger that such a commission may also succumb to the temptation of maintaining labor peace at any cost, thereby enhancing its record.

DEAN A. MCGEE, president of Kerr-McGee Oil Industries, Inc., Oklahoma City, Okla., was recently elected to the board of directors of the Oklahoma Cement Company.

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.

How much will an ERIEZ PERMANENT MAGNETIC PULLEY save you?

Erium® powered Eriez magnetic pulleys save one firm $1200 a year by removing 50 pounds of tramp iron a week from coarse clay. They can save you as much—or more, depending on your application.

In addition to preventing machinery damage, Eriez permanent magnetic pulleys prevent fires and explosions; assure product quality.

The pulley illustrated is one of 192 sizes (up to 36" diameter in any belt width) made by Eriez. **There is one for your exact application.** Two basic models are available: **Type AA,** ideal for separating small and medium tramp iron and fine ferrous contamination; **Type CR,** which performs best in removing large pieces of tramp iron.

All models are engineered and constructed to give you the finest in automatic separation. All are powered by Erium®—our exclusively-designed power source. Model for model, Eriez units give you the finest quality and consistency of magnetic strength.

For descriptive bulletin write to:

ERIEZ MANUFACTURING CO.
113UB Magnet Drive, Erie, Pa.

MAGNA-THOUGHT

We willingly share our design and application know-how to help our customers find new ways to improve their plant efficiency and product quality.

E. J. TENPAS
Supervisor,
Magnetic Engineering

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

Enter 76-B on card, page 241

Att'n:
Kiln Operators with Gas Cleaning Problems on Lime, Coal, Cement, Asphalt or Aggregate

For air pollution control, and for solids recovery from kiln gases, the S-F Venturi scrubber's unique design assures reliable performance without maintenance problems. The Chemico S-F scrubber was specifically designed to permit the recycle of slurries with high solids content. It has no nozzles, trays or jets to plug, and it completely eliminates build-up at the gas inlet.

Chemico S-F Venturi scrubbers are now operating efficiently on kilns throughout the country. For example, a unit installed one year ago on a reburnt lime kiln in California has never caused a kiln shutdown. This Venturi scrubber is designed to handle 35,000 Cfm of hot gases flowing at 450°F. It provides gas cleaning efficiencies of 99%+ on lime dust and 90%+ on soda fumes, resulting in a clean stack.

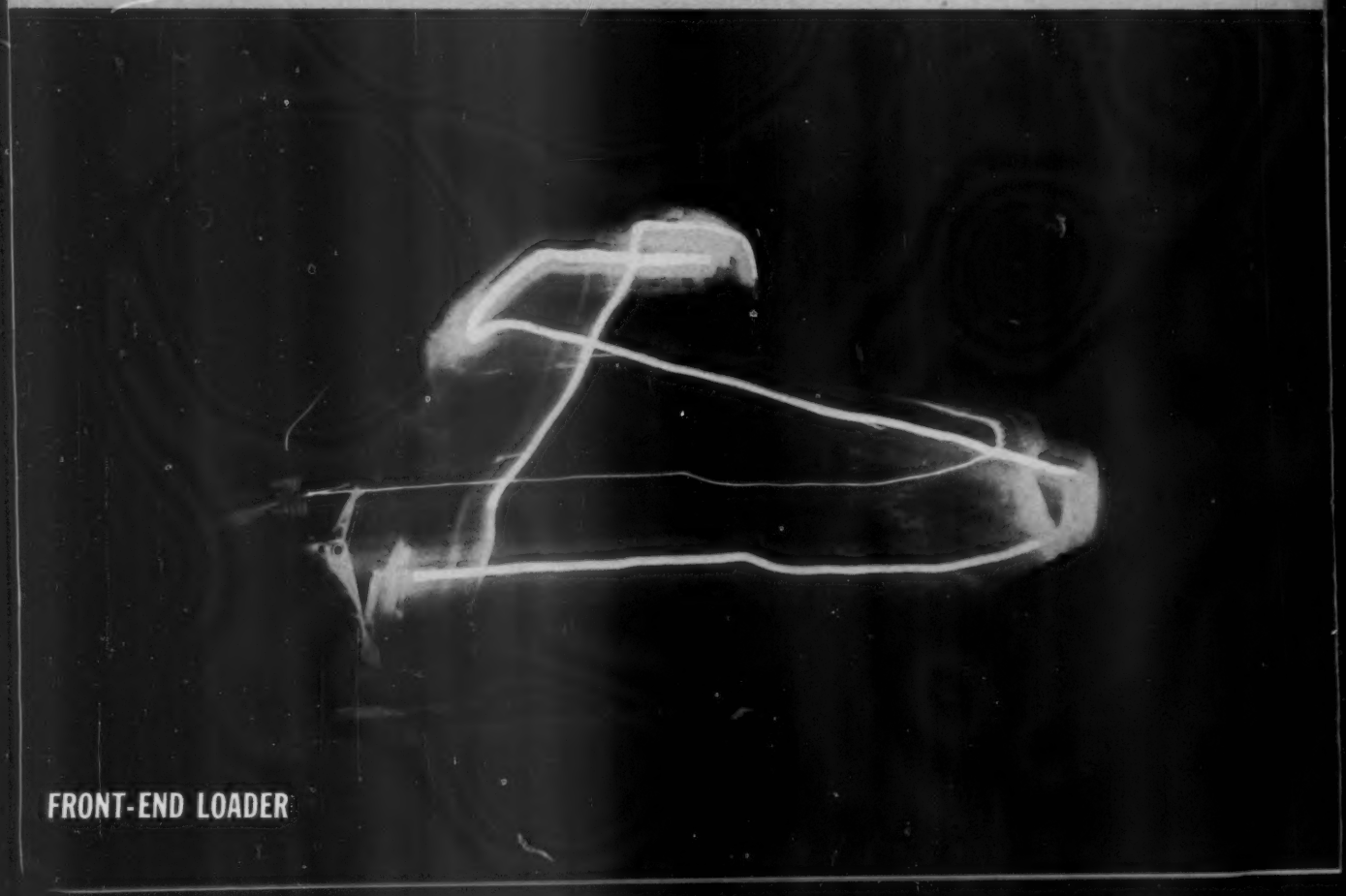
If you are considering the installation or replacement of gas cleaning equipment, learn more about Chemico scrubbers by writing to: CHEMICO—Gas Scrubber Division. All inquiries will receive prompt attention.

CHEMICO

Chemical Construction Corporation, Gas Scrubber Division
320 Park Ave., New York 22, New York

PERRNDALE, MICH. CHICAGO, ILL. LOS ANGELES, CALIF. HOUSTON, TEX. BARTOW, FLA. BIRMINGHAM, ALA. PITTSBURGH, PA.

SKOOPER'S standstill loading creates a light pattern that's short and compact . . . not long and extended like the one for the loader!



"Rivers of light" show how SKOOPER outperforms front-end loader

There's Nothing Like It on Wheels or Tracks!

Cycle test proves SKOOPER best!

Shown here are actual time-exposure photographs of a Koehring 205 SKOOPER and a rubber-tired front-end loader of similar bucket capacity going through actual digging and dumping cycles under identical conditions. A light was attached to the bucket of each machine, and the light pattern traced by each bucket was recorded by time-exposure photography.

The light patterns show that, with SKOOPER, all motion means work . . . there are no flying starts, no spinning tires, no churning crawlers, no waste drive-in, back-off motion . . . SKOOPER stays in one spot and really bails dirt, delivers big loading tonnages — using less horsepower, with less maintenance!

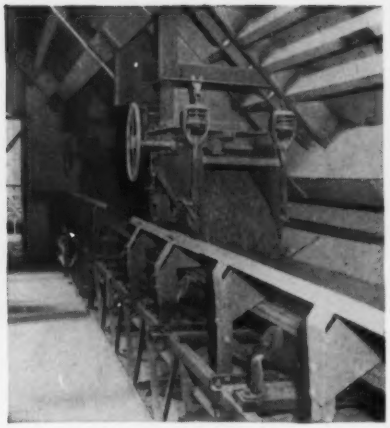
See your Koehring distributor for complete details on the profit pattern that SKOOPER can produce for you!

SEE YOUR KOEHRING DISTRIBUTOR

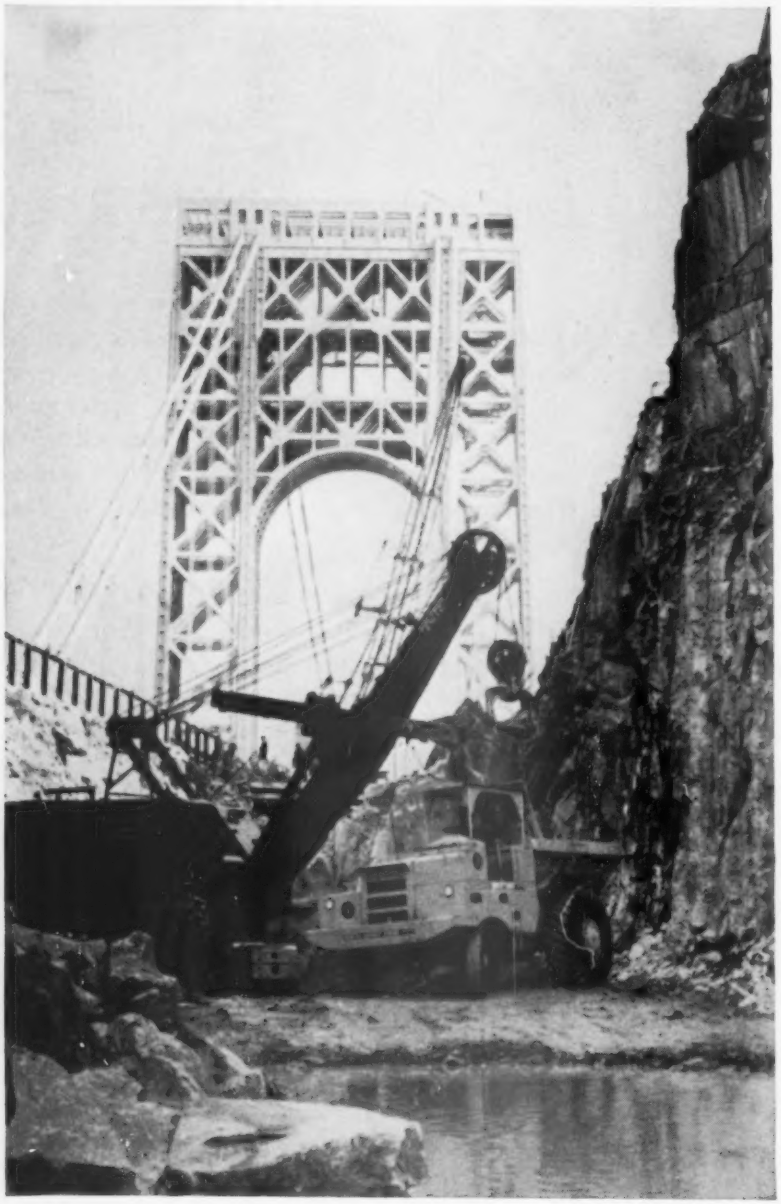
K107

KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin

Excavated stone returns as concrete to George Washington Bridge's second level



A group of Jeffrey 3DHS vibrating feeders discharges stone from storage bins to belt conveyor at 100 T.P.H. for recrushing at the Bogota, New Jersey plant of Geo. M. Brewster & Son, Inc.



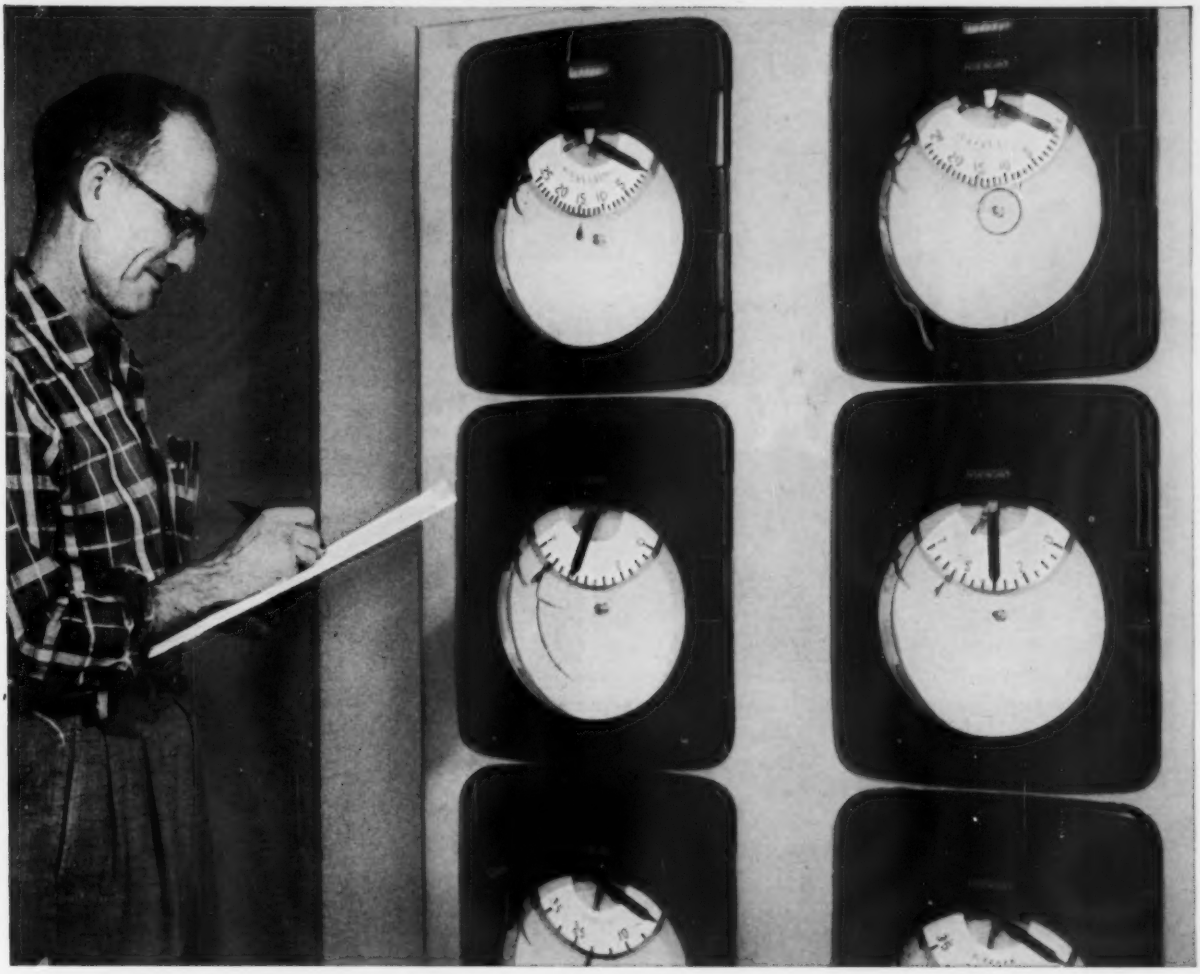
SOLVES BOTH A DISPOSAL AND SUPPLY PROBLEM. Stone excavated during preparatory work at bridge is reduced to 8" minus crushed rock, then hauled to processing plant at Bogota, New Jersey, six miles away, where it is reduced again to aggregate for use in concrete work at bridge site.

The reduction operations are highly automated—a major reason for selection of reliable Jeffrey vibrating feeders both at bridge and at cement plant. A 5' x 12' Jeffrey feeder operates ahead of the primary jaw crusher at the bridge. Eleven more Jeffrey conveyors serve at the Bogota plant. Six are used under receiving hoppers, controlled electrically to provide any desired blend of rock from storage bins.

In service like this, Jeffrey vibrating feeders provide extremely low maintenance, high volume operation. Jeffrey engineers utilize their experience of more than thirty years to provide dependable day-in, day-out operation. You'll find a broad variety of Jeffrey conveyors to handle a variety of conveying needs—for hot as well as abrasive materials. For more information, write The Jeffrey Manufacturing Company, 917 N. Fourth Street, Columbus 16, Ohio.

If it's conveyed, processed or mined, it's a job for Jeffrey.

JEFFREY



with this Foxboro Mass Flow System Arkansas Cement measures clay slip directly in pounds-per-hour

Unusual control methods are standard procedure at Arkansas Cement Corporation's Foreman Plant.

Take their two Foxboro Mass Flow Metering Systems for example. These unique systems use Foxboro Magnetic Flow Meters — the meter with no flow restrictions — to measure clay slip flows in gpm (recorded on top instruments), while gamma ray density cells measure solution density (middle two recorders).

The product of these two values is then recorded directly in pounds-per-hour on the two bottom Dynalog* Electronic Recorders. The control panel is located in the plant's laboratory so the technician can adjust slurry flows exactly as required.

The only maintenance ever required on the complete system has been the occasional replacement of a vacuum tube.

Mass flow — pressure — temperature — motor load — no matter what your process variable, there's a Foxboro System to measure and control it. And an industry-trained Foxboro Field Engineer nearby to help with the details. Call him — or write Foxboro direct about your problem. The Foxboro Company, 227 Norfolk St., Foxboro, Mass.

*Reg. U.S. Pat. Off.

TWO FOXBORO 4-inch Magnetic Flow Meters measure flow of overburden slip. Since Magnetic Meters have no flow restrictions of any type, they measure slurries as simply as water. Measurement is made magnetically from electrodes flush-mounted in meter wall.

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US CONVEYOR BELTING

New U.S. SlurryKing takes loads up steeper grades

Now you can carry slurries, wet cement, paper pulp slush, and other wet or dry materials up steeper inclines than possible with conventional smooth-surfaced belts. The new U.S. SlurryKing was designed especially to prevent avalanching of solids, even carries the fluid portion of wet mixes along with the solids.

An exclusive heavy-duty cover design withstands the severely abrasive effects of both wet and dry materials to retain the belt's hill-climbing ability indefinitely.

What's more, the U.S. SlurryKing enables you to drain or retain the fluid portion of slurries depending upon the angle at which the conveyor and idler rollers are set. You enjoy a new kind of belt performance and flexibility.

You'll find the SlurryKing the answer wherever you need to move raw materials up steeper inclines with greater safety and control.

• • •

For information about the SlurryKing, see your "U.S." Distributor. He's your best on-the-spot source of quality products, quick delivery, and technical service.

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The Editor's Page

Cement Industry Progress

WHEN the record 5-year expansion program of the cement industry began to taper off in 1959, and especially when the demand for cement began to drop sharply early in 1960, it was felt by many that a new era was beginning for the industry. The emphasis on expansion, it was believed, would gradually shift toward the attainment of greater plant efficiency, more uniform product, lower production cost, etc.; but no important slowdown in plant expansion and improvement was expected. New and startling developments in methods and equipment and in automatic control were predicted. It was also believed that the demand for cement would quickly resume its upward trend.

The demand for cement has not increased materially since the January, 1960, slowdown, but all the other expectations have been fulfilled, and some of them surpassed. The successful operation of a fully automated, electronic-computer-controlled raw material preparation department by a California cement plant was a big step toward the solution of many production, cost, and quality problems. This was followed by a new plant in Michigan which combined the use of record-sized kilns, mills, etc., with a highly automated system of centralized controls to achieve extremely low first cost per barrel of annual cement production and low production cost.

THE next big step forward, described in detail in this issue, is a new Midwestern plant which features an instrumentation concept designed to provide continuous automatic control of all principal equipment and important process variables.

Now under construction in the East is a new plant which will have the largest equipment on this continent. Located on navigable water, this plant will ship to distribution points along the entire Atlantic coast.

We have, in PIT AND QUARRY tried to keep our readers fully informed on all of these developments. Each important step has been publicized in detail as soon as it was far enough along so that useful information was available. In line with this policy the annual cement section in this July, 1961, issue of PIT AND QUARRY contains articles on a variety of recent important developments.

OUTSTANDING is a detailed description of the new plant of the Dewey Portland Cement Company at Tulsa, Okla., and its advanced instrumentation and control concept. In the few months this plant has been in operation it has already shown that it can produce a more uniform product at higher capacity with the minimum of operating personnel.

Also described is the new 4,000,000-bbl. "captive" plant of the Miron Company Ltd. at Montreal, Que. This article features the world's largest dry-process kiln and a unique layout. A total of 28 raw material, mill feed and cement silos in a rectangle inclose the clinker storage room.

In addition, we offer the first actual description of the new white cement plant of the Riverside Cement Company at Crestmore, Calif. This is the first new white cement plant in this country in many years and it is believed to be the first anywhere to use the dry process.

Other articles in this section describe important and interesting operating and technical developments.

Walter E. Trauffer

THEME OF N.L.A. CONVENTION:

New Market Possibilities

- **Lime-soil stabilization growing**
- **Lime-asphalt paving, steel mill use promising**
- **Sand-lime building products potential market**

THE development of the new and larger markets for lime was again the highlight of the 59th annual convention of the National Lime Association, held at The Grand Hotel, Point Clear, Ala., May 11 to 13, 1961. The use of lime for soil stabilization, the largest new market, has been applied not only to highway construction but also to airbases, railroad roadbeds, etc., and these applications were described. Other promising markets include lime-asphalt paving and sand-lime building products.

Members were also informed of the excellent progress being made in the association's research activities on a wide variety of subjects, including lime and clay mineralogy, lime and lime-pozzolan reactions, lime-asphalt paving, etc. A lime research trend study is expected to uncover new uses for lime.

The convention was well attended by members and their wives from all parts of this country and Canada. Honored guests from Germany were: Dr. Hermann Lange (Hohenlimburg Kalkwerke), president of the German Lime Association (Bundesverband Kalkindustrie); Dr. Paul Alff, general manager of the German Lime Association,

By WALTER E. TRAUFFER

and Mrs. Alff; Dr. Paul Ugowski, president of the Rheinische-Westfalische Kalkwerke at Dornap; and Ernst Ellsiepen, an executive of one of the largest German lime companies at Wulfrath.

The Fall Operators' Meeting will be held October 5 and 6 at the Shoreham Hotel, Washington, D. C. The 1961 annual convention will be held in April at the Homestead, Hot Springs, Va., where so many meetings have been held in the past.

Association Activities In his report on association affairs and activities, Robert S. Boynton, general manager of N.L.A., said that there seems to be some pickup in the demand for lime, but this trend is being counteracted to some extent by the expanding captive operations. Steel and highways are now the only expanding lime markets, but one can be too optimistic about the former. Road stabilization demands, however, went up 25 percent in 1960 to over 250,000 tons, and prospects are excellent. Mr. Boynton said that the association is actively going ahead with its promotional and research programs.

President-elect Amos B. Miner (National Gypsum Company) stated that the association, which now represents about 90 percent of the capacity of the industry in the United States and Canada, is doing an excellent job of bringing together all strata of the industry, in operations, technology, administration, etc. In spite of the recession, no essential activities or services were curtailed or eliminated. A financial report and suggestions were presented by the newly elected treasurer, William H. Price II (Gibsonburg Lime Products Co.).

Elections Because of the resignation of John M. Junkin it was necessary to elect a new slate of officers. Amos B. Miner (National Gypsum Company), the new president, had previously headed the association from 1953 through 1956. The new vice-president is M. A. Rikard (Southern Cement Company), who was president from 1956 through 1960. William H. Price II (Gibsonburg Lime Products Company) was elected treasurer. All members of the association staff were re-elected, including: Robert S. Boynton, general manager; Georgia M. Coffman, secretary; Kenneth A. Gutschick, manager, tech-

SOME OF THE OFFICERS, STAFF, AND SPEAKERS at the recent National Lime Association convention held in Point Clear, Ala. Left to right: Wesley R. Koster, Business and Defense Services Administration; Robert S. Boynton, general manager of N.L.A.; Loche White Jr., Southern Research Institute; William H. Price II (Gibsonburg Lime Products Co.), new treasurer of N.L.A.; Amos B. Miner (National Gypsum Co.), new president of N.L.A.; Kenneth A. Gutschick, manager of technical services, N.L.A.

nical service; and Conard M. Kelley, highway engineer.

Paul Sunderland (Ash Grove Lime and Portland Cement Co.) fills the place on the executive committee left vacant by Reed C. Bye (Warner Co.), who recently retired. Other members in addition to Messrs. Miner and Rikard are: Bolton L. Corson (G. & W. H. Corson, Inc.); Lester Crown (Marblehead Lime Co.); Kennedy Ellsworth (U. S. Lime Products Div.); C. C. Loomis (New England Lime Co.); J. S. Offutt (U. S. Gypsum Co.); J. H. Robinson (Gypsum, Lime and Alabastine Ltd.); E. D. Williams Jr. (H. E. Millard Lime and Stone Co.); and F. L. Witmer (Ohio Lime Co.).

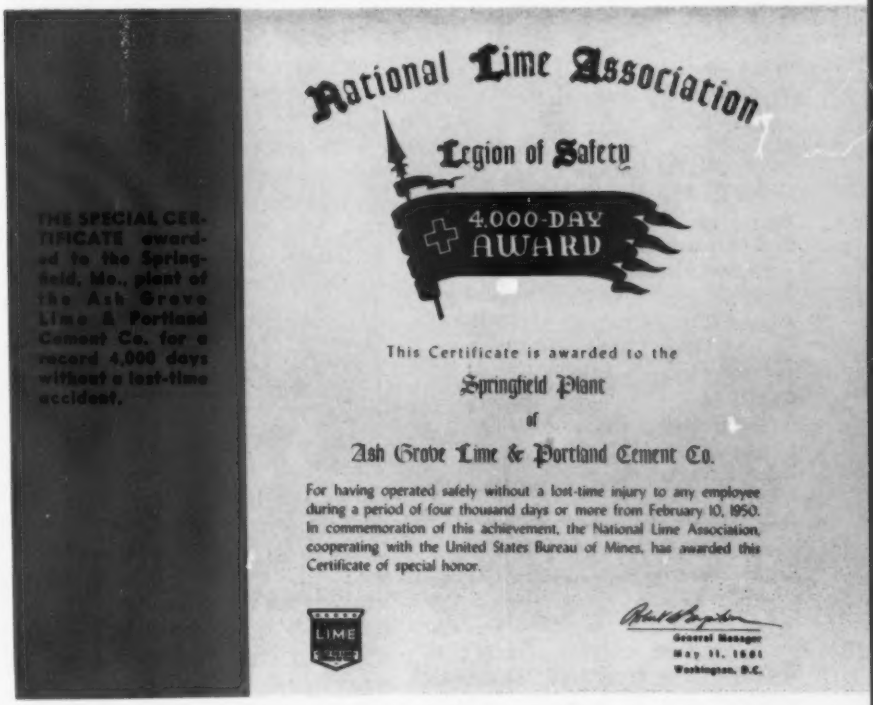
Members of the board of directors are:

District 1
J. M. Deely Jr., Lee Lime Corp.
W. J. Ash, New England Lime Co.

District 2
Bolton L. Corson, G. & W. H. Corson, Inc.
Claude H. Barrick, S. W. Barrick & Sons, Inc.
E. D. Williams Jr., H. E. Millard Lime & Stone Co.

District 3
Amos B. Miner, National Gypsum Co.
Paul Krentel, Warner Co.
C. Ray Hutchison, Mercer Lime and Stone Co.

District 4
Charles E. Brown, Chemstone Corp.


THE SPECIAL CERTIFICATE awarded to the Springfield, Mo., plant of the Ash Grove Lime & Portland Cement Co. for a record 4,000 days without a lost-time accident.
National Lime Association
Legion of Safety
4,000-DAY AWARD
This Certificate is awarded to the
Springfield Plant
of
Ash Grove Lime & Portland Cement Co.
For having operated safely without a lost-time injury to any employee during a period of four thousand days or more from February 10, 1950. In commemoration of this achievement, the National Lime Association, cooperating with the United States Bureau of Mines, has awarded this Certificate of special honor.
LIME
General Manager
May 11, 1961
Washington, D.C.

SOME OF THE VISITORS FROM GERMANY were: Elmer Wodetzky of the Poreen Corp.; Dr. Paul Alff, general manager, Bundes-verband Kalkindustrie (German Lime Assn.), Cologne; and Mrs. Alff; Dr. Hermann Lange, Hohenlimburg Kalkwerke, president of the German Lime Assn., both at Hohenlimburg; and Dr. Paul Ugowski, president, Rheinisch-Westfalische Kalkwerke, Dornap.

George A. Zeigler, M. J. Grove Lime Co.
Charles A. Hartman, Peery Lime Co., Inc.

District 5-A
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Lester Crown, Marblehead Lime Co.
E. H. Siebrasse, Menke Stone & Lime Co.
R. F. Mathews, Mississippi Lime Co.

District 8
V. F. Nast, Western Lime and Cement Co.

District **9**
Paul LaLiberte, Cutler-Magner Co.

District 10-11
H. Clay Davis, Longview Lime Corp.
M. A. Rikard, Southern Cement Co.
George L. Scott Jr., Alabaster Lime Co.

District 12
Paul Sunderland, Ash Grove Lime & Portland Cement Co.
Russell Hunt, Southwest Lime Co.

District 13
G. E. Robinson, Austin White Lime Co.
J. S. Offutt, U. S. Gypsum Co.

District 14
A. Leo Gallagher, Elliston Lime Co.

District 15
Ralph S. Locke, Diamond Springs Lime Co.
John Gardner, Utah Lime & Stone Co.

Canada
J. H. Robinson, Gypsum, Lime & Alabastine, Ltd.
J. S. Wheeler, Cobo Minerals, Ltd.

SPECIAL AWARD. The Kimballton, Va., plant of the Standard Lime & Cement Co. (Division of American-Marietta Co.) was one of two winners of a special 1,000-day award. Louis Mueller of that company is holding the award.

Safety Contest The results of the 1960 N.L.A. lime plant safety competition were announced by Kenneth A. Gutschick, manager, technical service, N.L.A. Results, he said, were in general not so good as last year, but increased interest in safety is evident in the fact that there were 8 new entrants, for a total of 66 plants, in the contest, a new high. A total of 19 plants operated without lost-time accidents, as compared to the all-time record of 22 plants in 1959, and 15 in 1958.

The real highlight was the outstanding record of the Springfield, Mo., plant of the Ash Grove Lime & Portland Cement Co., which on January 3 reached the 4,000-day mark without a disabling injury, and on February 10, the eleventh successive year. This is far ahead of the previous all-time record of 2,748 hours set back in the 30's by another company. A special N.L.A. award for this achievement was accepted by Richard M. Slater of the Ash Grove Company.

Special 1,000-day Safety Certificates were awarded to the Kimballton, Va., plant of the Standard Lime & Cement Co. and the Natividad, Calif., plant of the Kaiser Aluminum & Chemical Corp. The Standard award, the third for this company in a year, was accepted by Walter L. Tribull. The award for Kaiser, its second, was accepted by E. C. Tinsley. Five such awards were won in the 1959 contest; but since the 1,000-Day Club was formed in May, 1937, there have been only 22 awards.

The following are the 19 plants which had no lost-time accidents during the 1960 contest. They are given in their contest classifications, in the order of their standing, and with the number of man-hours worked. All will receive the N.L.A. Certificate of Achievement, and the winner in each class will receive a safety trophy at the Fall Operating Meeting in Washington.

Class A-1—Quarries with calcining plants working 100,000 man-hours or more:

U. S. Gypsum Co., Genoa, Ohio—392,725.
Kaiser Aluminum & Chemical Corp., Natividad, Calif.—235,434.
U. S. Gypsum Co., New Braunfels, Tex.—230,881.
National Gypsum Co., Gibsonburg, Ohio—212,850.
Standard Lime & Cement Co., Div. American-Marietta Co.—Knoxville, Tenn.—101,607.
Lee Lime Corp., Lee, Mass.—100,950.

Class A-2—Quarries with calcining plants working less than 100,000 man-hours:

National Gypsum Co., York, Pa.—86,870.
U. S. Lime Products Div., The Flintkote Co., Las Vegas, Nev.—69,209.
Rockwell Lime Co., Manitowoc, Wis.—50,319.
Carton L. Comfort Co., Mt. Pleasant Mills, Pa.—7,496.
Ehrenzeller Lime Co., McVeytown, Pa.—2,000.
John R. Martz & Sons Co., Hustontown, Pa.—1,448.

Class B—Underground mines with calcining plants:

Mississippi Lime Co., Ste. Genevieve, Mo.—270,296.
Standard Lime & Cement Co., Div. American-Marietta Co., Kimballton, Va.—165,680.
Material Service Div., General Dynamics Corp., Quincy, Ill.—55,065.

Class C—Calcining plants only:

Material Service Div., General Dynamics Corp., Thornton, Ill.—181,772.
The Dow Chemical Co., Ludington Div., Ludington, Mich.—91,701.
Ash Grove Lime & Portland Cement Co., Springfield, Mo.—70,524.
Cutler-LaLiberte-McDougall Corp., Superior, Wis.—60, 865.

In closing, Mr. Gutschick reviewed the first summary report ever made by N.L.A. of monthly injury statistics. This was published in the February issue of N.L.A.'s *Safety Topics*. While 1959 was a bad year, safetywise, for the lime industry, 1960 was even worse,

with the F. R. rising 10 percent to 13.44 disabling injuries per million man-hours, and the S. R. to 2,598 days lost per million man-hours. This is the worst record since 1957. The best year was 1958, when the F.R. and S.R. were at the all-time lows of 9.73 and 731 days, respectively.

TWO OF THE SPEAKERS—John S. Wheeler of Cobo Minerals Ltd., Toronto, and Commander Neil Barnaby, McCain Naval Air Station—and (right) Kenneth L. Hammond (Alabaster Lime Co.), a 44-year member who presided over the Friday meeting.

Soil Stabilization Progress The progress being made in the use of lime for soil stabilization continues to be a highlight of the market picture. According to Conard M. Kelley, highway engineer for N.L.A., the use of lime for this purpose continues to expand rapidly in the Southern states, and its acceptance in the North, where weather conditions are a handicap, is growing. Stabilization jobs in Nebraska, Wisconsin, North and South Dakota, Ohio, New York, etc., are holding up well in spite of a severe winter. In North Dakota, Mr. Kelley said, street and highway jobs are holding up very well after three winters, and in Nebraska after four winters. In New York the success with subgrades has been spectacular. Excellent slides showed a job at the new Utica, N. Y., airport, where a road was built through a quagmire.

Lime-fly ash bases for roads, driveways, building foundations, etc., are also gaining in popularity, according to Mr. Kelley. Projects using this material include new roadbed construction and maintenance by the Santa Fe and other railroads, the new Houston (Texas) ball park, and the new $60,000,000 McCain Naval Air Base in Mississippi, which is using 3,000 tons. The field of lime-asphalt paving continues to show excellent possibilities, and the asphalt industry is helping to promote it. The National Bituminous Concrete Assn., the speaker said, is setting up a research program for contractors.

Lime-Clay Mineralogy A report on the progress of the N.L.A. Fellowship on Lime in Clay Mineralogy was given by James L. Eades, research fellow at the University of Illinois, who is now devoting his full time to this work. The major purpose of this 3-year program is to investigate the nature of the reaction of various soils when lime is added and to give county engineers a simple explanation of what happens.

It has been proved in these tests that the reactions are not just ion exchange but are actual cementing, the lime reacting to form silicates. Slides of thin sections under the microscope showed the extent of binding with various minerals. Tests soon to be completed, said Mr. Eades, should prove the feasibility of providing small, inexpensive kits to county engineers, so that they can quickly make simple tests in the field to determine the amount of lime required by any soil.

Lime-Pozzolan Research A progress report on the N.L.A. Fellowship on Lime and Lime-Pozzolan Stabilization presented by Professor George Hollon of the University of Illinois, brought up to date his preliminary report of a year ago. Since then a booklet and a manual have been completed, and a $100,000 circular test track has been built to give quick test results under field conditions. Tests are now being made with 21 samples of 8 different types of material. Mixes consist of 4 percent lime, 14 percent fly ash, and 82 percent aggregate, by weight, plus water. Several base thicknesses and both gravel and crushed stone were used.

The 18-ft. width of the circular track, Professor Hollon pointed out, made it possible to use small road equipment in order to simulate closely the actual field conditions. Current tests were made with an 1,800-lb. wheel load, and 3,000- and 3,200-lb. loads will later be used to determine the thicknesses required. An excellent movie showed the track and tests being made.

Lime in Asphalt Roadbeds The potential markets for lime in asphalt paving and railroad subgrade stabilization were described by Kenneth A. Gutschick in a talk illustrated with color movies. Movies of this type are important features of the N.L.A. educational program, which includes talks at highway meetings.

The advantages of using lime in asphalt paving have already been widely publicized through bulletins, talks, articles in road magazines, etc.; and this movie is the latest step. In Colorado, where lime in asphalt has been pioneered, nearly all hot-mix aggregates are produced in contractor-operated portable plants using local gravel supplies. Many of these deposits, according to Mr. Gutschick, are poorly sorted and contain some clay. If they were not upgraded with additives like lime, the results would be poor. Lime also permits slightly more asphalt to be used, resulting in greater waterproofing, less stripping, and less swell.

In Colorado the highway department last year let 25 contract jobs, totaling 140 miles, and using nearly 3,000 tons of lime. The film showed several of these jobs from aggregate pit through to the completed pavement. In all three courses —

TWO OF THE SPEAKERS—Thomas C. Miller (National Gypsum Co.) and James L. Eades, N.L.A. Research fellow at the University of Illinois—and (right) V. F. Nast Jr. (Western Lime & Cement Co.), who presided over the Saturday meeting.

LIME RESEARCH. Professor George Hollon, University of Illinois, who spoke on lime and lime-pozzolan research, with Robert S. Boynton, general manager of N.L.A.

subbase, base, and paving—1 percent lime was used.

The second movie showed a railroad subgrade project in Texas which is still under construction. The typical black gumbo clay of the Gulf Coast is poor sub-grade soil, and the practice had been to use a 12-in. mud and shell sub-base. An 8-in. base of in-place clay-lime stabilization effected a 40 percent saving and greatly speeded up completion in spite of heavy rains. This is another promising market. Mr. Gutschick added that considerable interest is also being shown in the use of lime in slurry form in the maintenance of existing subgrades.

Air Field Stabilization *Subgrade Stabilization with Lime at Meridian Naval Air Station* was described by Commander Neil Barnaby, engineer of construction at the McCain Naval Air Station, Meridian, Miss. This first Navy stabilization job involves about 300,000 sq. yds. of 6-in. stabilization, including a 150- by 6,500-ft. emergency runway and a 75-ft. wide taxiway of the same length. This stabilization work was actually at an outlying field 30 miles from the main McCain installation and greatly expedited its construction.

Because of the variety of soils, the highly plastic nature of the clay subgrade, and heavy rainfall, this job would still have been far from completion without the use of lime. To date 3,600 tons of lime have been used. According to Commander Barnaby, the use of 4½ to 5 percent lime reduced the plastic index of the soil from 37 to 0, the volume change from 72 to 0, and the swell limit from 1 percent to .03 percent; and it increased the California bearing ratio from 5 to 70. Cuts and fills up to 30 ft. were involved.

Research Trend Study At the meeting a year ago it was recommended by the new Project Steering Committee that expert advice be obtained to find and investigate potential new and profitable markets for lime, and to make a broad study of lime trends. A report on the results to date was given by Locke White Jr., assistant director, Southern Research Institute. This work falls in three categories: (1) future potentials of present lime uses, (2) future potentials of lime substitutes, and (3) possible new uses for lime.

Through its many contacts, Mr. White pointed out, the Institute is developing information on potentials. So far, only a few minor market possibilities have been developed. One of these was the use of lime to settle out fumes created by the new L.D. (basic oxygen) steel-making process, which is just gaining a foothold in this country. There is also the possibility that rotary kiln lime, being more reactive than the vertical kiln lime produced by captive plants in the steel industry, might be sold to them for this purpose in place of their own output.

Calcium Carbonate By Alkali Method A paper entitled *The Manufacture of Finely Divided Calcium Carbonate by the Alkali Method,* presented by Thomas C. Miller, National Gypsum Co., described some interesting research on preparing commercially usable calcium carbonate fillers from sulphate pulp mill wastes in lieu of calcination into lime. This is one phase of the almost limitless area of application of lime shown in his paper on *A Study of the Reaction Between Calcium Oxide and Water,*

which won the first Azbe Award. Mr. Miller declared that it is possible under carefully controlled conditions to produce almost any desired particle size from coarse to 77,000 cm.²/gm. Blaine by controlling the reaction time, temperature of reaction, etc. Slides and petrographic microphotographs were shown.

FROM ACROSS THE COUNTRY. H. Clay Davis (Longview Lime Corp.—Alabama) and William Ash (New England Lime Co.—Massachusetts).

Lime in Building Products *German Lime-Based Poreen Concrete* was described by Elmer Wodetzky, of Massapequa, N.Y., who has been active for many years in licensing U. S. industry to make products developed in Germany. It was pointed out that in Germany the number of sand-lime building units produced in 1958 was more than double that in 1950, and that the lime used jumped from 383,000 tons to 933,000 tons annually. In the United States about 300,000 tons of lime is being used for these products, and most of that is carbide lime, a waste product. This difference he attributed largely to the fact that German lime producers and others interested have long carried on intensive educational and publicity programs, while in this country such efforts have been largely carried on by competitive industries. There are 120 sand-lime products plants in Germany, compared to only a few here.

John Wheeler (Cobo Minerals, Ltd.) also a successful manufacturer of sand-lime-brick in Toronto, Ont., said that in Russia no cement is used where lime can be used. Brick, block, prefabricated slabs, and even entire bathrooms as a unit are made with quick or hydrated lime and 2½ million tons are used annually for building purposes. He stated that Russia is far ahead of us in calcium silicate chemistry, and that we need to do much research in this field.

Poreen was described by Mr. Wodetzky and Dr. Hermann Lange, a lime producer from Germany. It is, briefly, a high-pressure steam-cured building unit in which about half of the cement is replaced by lime. It is said to be cheaper and stronger than cement concrete, with less shrinkage and absorption, and contains no free lime. It is adaptable for every concrete product use, including pipe, sidewalk slabs, roof tiles, etc. Excellent slides showed the manufacture and use of Poreen products in Germany.

Growth Potentials In describing *Growth Potentials in The Chemical Industries,* Wesley R. Koster, Chemical and Rubber Div., Business and Defense Services Administration, U. S. Department of Commerce, compared the status of the lime industry with others in this category. Government statistics were used to show that lime, with an annual growth rate of 4.4 percent in volume, is in the lower echelon of the growth patterns of most chemicals. He also showed that these chemical industries in 1959 spent nearly $1 billion on research and development, $675 million representing private funds from industry. This was 2.6 percent of the sales value of this industry. There are no official figures on what was spent for research by the lime industry. Mr. Kostner urged producers to take advantage of the facilities offered by BDSA, which has field offices in 33 cities.

Social Activities As usual at these meetings, the social side was not neglected. Included were cocktail receptions, a Seafood Jubilee Dinner, and the annual banquet. For the ladies there was also a tour of the famous Bellingrath Gardens. For the men there was the annual N.L.A. Golf Tournament.

Tariff Commission's Ruling Ups Duty on Belgian Cement

The Tariff Commission ruled again that certain shipments of foreign portland cement are hurting American producers and that they require higher import duties under the anti-dumping law. This body decided that imports of Belgian cement being sold in Florida marketing areas are injuring American cement producers who also sell in this region.

According to reports released by the U. S. Treasury to the commission, cement was being sold at prices below the prevailing prices in Belgium. The Treasury will therefore impose higher duties on such shipments to keep prices equitable —comparable with those in Belgium.

The Tariff Commission and the Treasury made a similar joint finding on portland cement imports from Sweden last April.

Management of the Holiday Sand and Gravel Company, Bonner Springs, Kans., took over the Bonner Springs Sand and Material Company on June 1. It is Holiday's fifth plant on the Kansas River.

Quality Control

FROM SOURCE TO CUSTOMER KEYNOTE OF New

Wyoming Bentonite Operation

By BUREN C. HEROD

UNIQUE raw material, equally unique products with virtually unlimited versatility of application, and the intervening complex processing stages under optimum quality control comprise the basic elements of an unusually interesting operation in a specialized nonmetallic field. The raw material is bentonite, and its processing described here is carried out in a modern new plant at Colony, Wyo.—one of two Wyoming bentonite operations of the Federal Foundry Supply Division of Archer-Daniels-Midland Company.

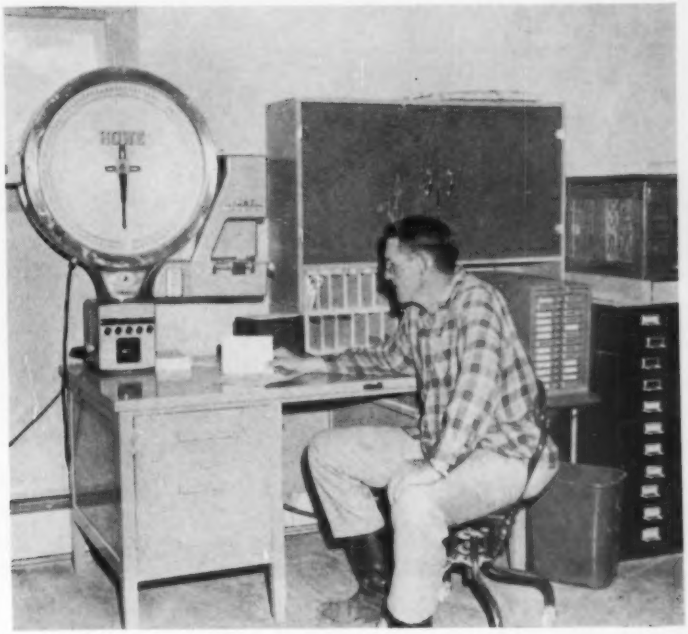
Development of the new Colony installation was born in the successful search for broadened product application. The latter is a constant goal in the industry—researchers are continually investigating new uses for bentonite, as well as improvements in the numerous existing applications. At Colony, a large part of the output is consigned to taconite processors, a recently developed market that made it feasible for A-D-M to undertake an extensive plant construction project in an area of vigorous competition.

With the addition of the 9,000-ton per month Colony mill, the company has more than doubled its productive capacity of Wyoming bentonite. The older companion plant is located at Upton, Wyo. Operations have been conducted in the state for about 35 years. Wyodak Chemical Company, said to be the first bentonite producer and processor, started producing in 1926 and was acquired by A-D-M in 1957.

Designed by company engineers, the Colony plant was built around a production layout that matches the necessary high degree of modern processing technology with an efficiently simple flow system. The present installation, incorporating initial raw material sizing, drying, fine reduction, and packing stages, is housed in a 750,000 sq. ft. mill building that will readily accommodate a parallel layout in the future. An interesting feature of the mill structure is that it is self-sustaining, *i.e.*, no roof-supporting trusses and columns are necessary, which leaves the floor area clear for equipment arrangement. Adjoining the main mill is a modern office building with

Opposite page:
WITH THE ADDITION of this new 9,000 ton-per-month mill at Colony, Wyo., Federal Foundry Supply Division of Archer-Daniels-Midland has more than doubled its production of Wyoming bentonite.

A VIEW ACROSS THE TOP OF THE MILL toward the raw material stockpiles on the plant site. While it is carried in this inventory, the bentonite is "farmed" to lower the moisture content of the pit-run material to some extent through air drying.



THIS SCALE INSTRUMENT and recording unit in the main mill office records pit truck load weights transmitted from a remote scale at the entrance to the plant property. Drivers also report to this point via intercom, to give the type of material being hauled.

a changehouse and a laboratory; the latter department in particular plays a dominant role in the over-all operation.

Raw Material By its very nature, bentonite requires exceptionally close attention to every detail in each stage of its processing—beginning right in the pit. This is especially true of production such as that of this firm since the latter concentrates on marketing a top-quality highly colloidal product. In general, bentonite has been defined as a claylike mineral consisting primarily of hydrous aluminum silicates. Unique characteristics usually present include very fine grain size, high water content, high adsorptive power, and high plasticity.

Deposits of bentonite possessing the desired properties to the highest extent are not in surplus—nor are they scarce. In Wyoming they occur in the lower Benton formation of Cretaceous age, geologically, and are named for their primary formation source. Normally flat lying, the commercially exploitable beds are covered with overburden ranging from a few inches to 15 ft. in thickness.

Since the material in place varies in its physical properties not only from deposit to deposit but also within a given bed, production—as pointed out in A-D-M technical data—must be "controlled from the source" to assure meeting guaranteed product specification.

Pit Operations In developing an exposure to establish its extent and quality, the area is initially prospected with an auger drill. With the extent established, quality is checked by running lab tests on samples from drill holes sunk on 100-ft. centers. No stripping is undertaken until and unless the lab reports indicate the

AN EXAMPLE OF THE SEVERAL PITS from which the Colony mill is supplied. All pits are carefully mapped according to test hole analyses, and sections of specific grades are staked out. Overburden varies from a few inches to 15 ft. in thickness. Bentonite is the lighter material in this view.

material has passed exhaustive testing.

With material of proper quality, stripping ratios up to 10/1 are acceptable. After the overburden is removed, holes are drilled on 25-ft. centers. Bentonite from all of the holes is tested; and a map based on analyses of the material is drawn showing for each pit the extent and boundaries of material falling within specified ranges. These individual analysis sections are staked out so that it will be known which type of raw material is being dug.

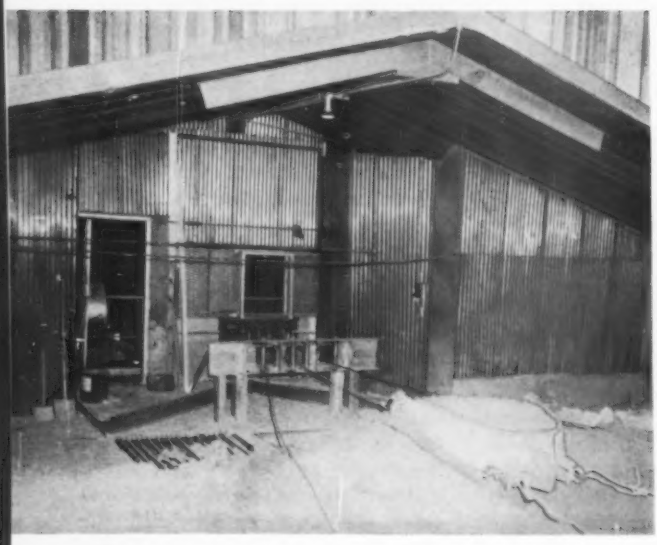
Excavation is handled with tractor shovels that also load trucks for haul to the plant. Average haul distance from the various pits now supplying the Colony mill is about 10 miles. All pit operations and haulage are performed under contract.

On entering the plant site, all trucks from the pits stop on a scale platform. Load weights are transmitted from this remote platform to the Howe scale instruments in the plant office, and are recorded on the scale's Mechanoprint unit. At the same time, the driver reports through an intercom, giving his truck number and the type of material with which his vehicle is loaded. When he arrives at the stockpile area near the mill, he dumps his load on the appropriate pile.

Plant Flow While it is contained in the various raw material stockpiles, the bentonite is "farmed" with a Hough Payloader. Although the material does not "air dry" to a great extent, the procedure serves to remove at least a part of the moisture content, which averages between 25 and 30 percent as received from the pits.

Feed to the processing system is initiated by transfer with a Payloader from the various piles into a covered storage area which holds approximately 1,500 tons.

In the storage building, the feed is rehandled by a scraper operated from a 3-drum Ingersoll slusher, and is pulled onto a slicer. Reduction is to about 1½-in. top size, and the discharge falls into a 100-ton capacity surge bin. The latter has sufficient capacity to accommodate a companion processing line to the present system.



Above:
MILL FEED is transferred from stockpiles into the storage structure with this machine.

Left:
A VIEW INSIDE THE COVERED STORAGE AREA, showing the slusher and scraper bucket pulling raw bentonite to a slicer (in front of and below the slusher).

The raw sized feed is transferred on a Link-Belt apron conveyor that forms the bottom of the bin to a following inclined L-B belt conveyor. A Merrick Weightometer is installed with the latter conveyor to record the tonnage entering the process.

A short lateral horizontal belt, which would be extended to supply a future second dryer, receives the material from the inclined conveyor and discharges into the present dryer feed chute. Under normal conditions, an average of 23 t.p.h. of bentonite is processed through the dryer. The dryer, an 8- by 60-ft. unit fired with oil through a Preferred Industries burner, was fabricated by the Equipment Division of Archer-Daniels-Midland, and is driven by a 40-hp. Masters motor through a Foote Bros. reducer.

In its operation, temperature—about 1,800 deg. F.—is held constant, and the rate of feed is varied in accordance with the moisture content of the raw material. Slow and careful drying at a relatively low temperature is admittedly a costly step in the over-all production. However, it has been proven that the procedure is essential to the preservation of the natural colloidal characteristics of high-grade bentonite.

Dryer discharge, with a moisture content of less than 8 percent, is transferred *via* a Link-Belt screw-and-bucket elevator system to a 150-ton capacity bin. The latter also has the capacity to serve a future duplicate mill line. From this bin, dried material is delivered by screw conveyor to the pulverizing stage.

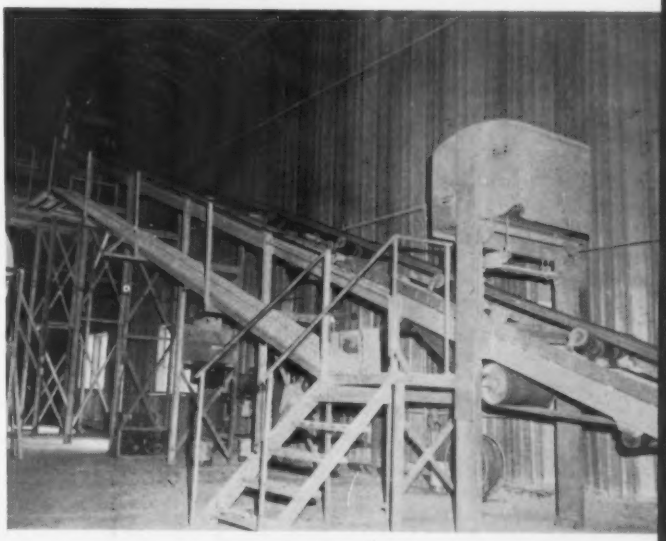
Fine reduction is accomplished in a Raymond roller mill with integral whizzer separator, operating in closed circuit with a pair of Raymond cyclone collectors. Driven by a 250-hp. G-E motor, the 5-roll mill has a 9-in. bull ring and is 66 in. in diameter. The whizzer has a 20-hp. drive, and the blower a 150-hp. Masters motor.

Approximately 25 t.p.h. of finely ground bentonite (85 percent plus passing 200 mesh) is produced in the mill and is transferred from the collectors in the circuit to either of a pair of 500-ton capacity concrete storage silos.

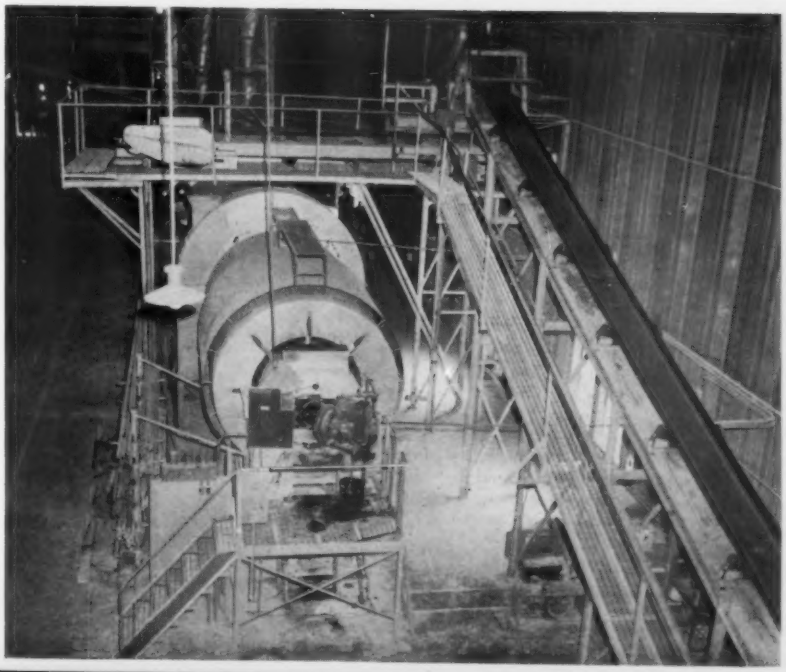
In the final stage of the flow,

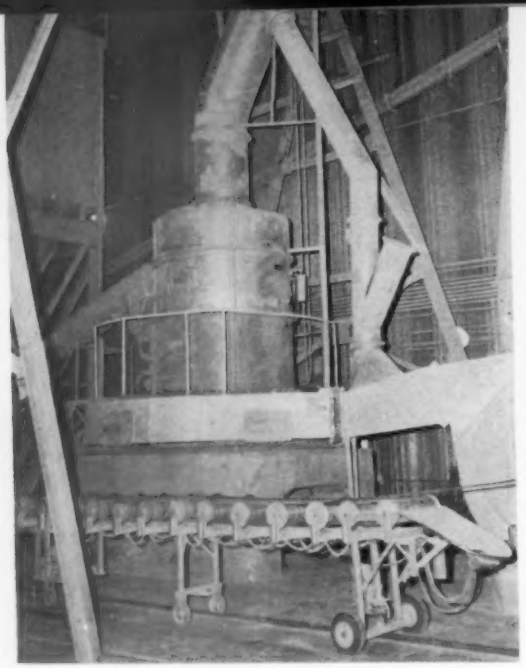
MINUS 1½-IN. RAW MATERIAL discharged from the slicer falls into the 100-ton surge bin. Processing flow is initiated on the apron conveyor forming the bottom of the bin.

Right:
ALL TONNAGE ENTERING THE PROCESS in the mill is recorded by the weighing unit at the right. This belt connects the surge conveyor and the dryer feed belt.



Below:
A VIEW FROM ABOVE THE SURGE BIN toward the dryer installation. Slow and careful drying is essential to the preservation of the natural colloidal characteristics of high-grade bentonite.

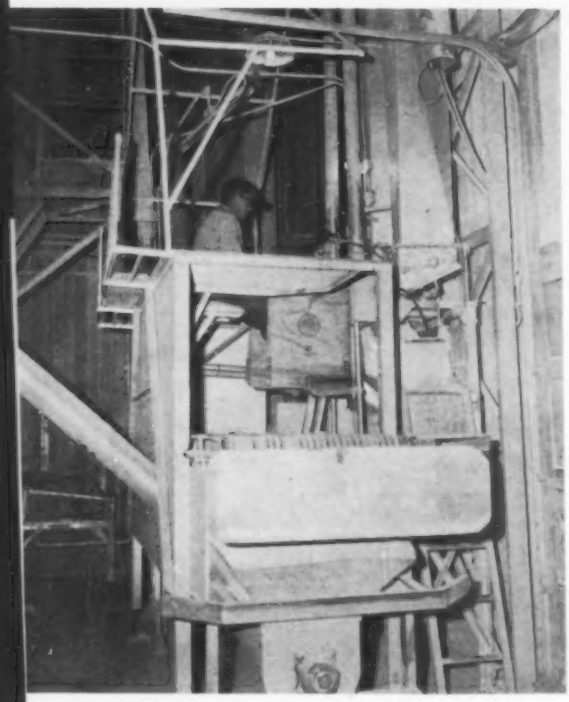




Right:
DRIED BENTONITE is ground in this mill, which has an integral separator and operates in closed circuit with a pair of collectors.

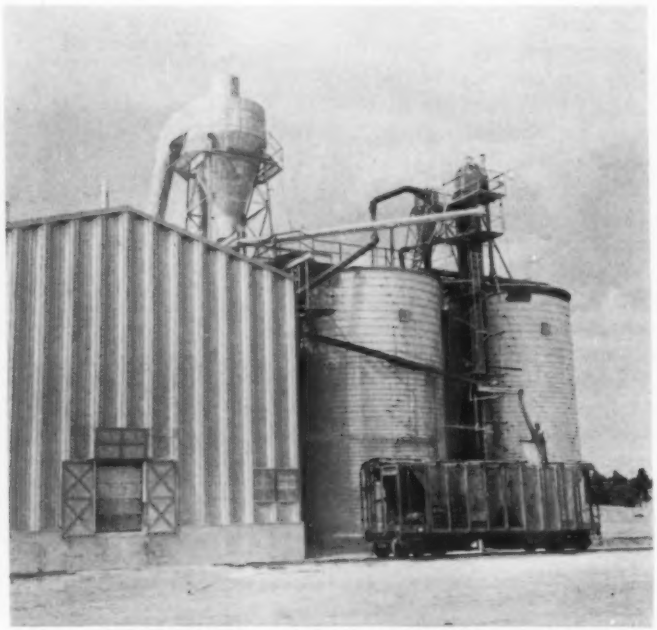
bentonite is transferred from the silo-bottom hoppers *via* pneumatic and bucket elevating lines to a pair of Sweco separators. Here, condensation lumps, if present, are removed and returned to the bucket elevator supplying the roller mill feed bin. Finished products from the separators are transferred to the feed bin of a packing machine or to the bulk rail-loading chute.

Bagged products are packed with a Black Products 2-spout bagger, the operation putting out from 400 to 500 units per hour of material packed in 100-lb. multiwall bags. The latter are carried on a Power-Curve conveyor from the packing station to the car-loading dock. An interesting protective step is involved at this point. Photographs are taken in the interior of loaded cars to show proper loading methods and protection. In the event of customer complaints on damaged shipments, the responsibility can be traced to rough handling of the car in transit.



Left:
BAGGED PRODUCTS are packed here in 100-lb. multiwall bags. Photographs are taken inside loaded freight cars for records of proper loading and protective measures.

Products The above processing delivers five basic sizes of high-grade bentonite marketed by the Federal Foundry Supply Division. These include foundry grade low gel, foundry grade high gel,



Right:
BOTH BULK AND BAGGED SHIPMENTS are made from the Colony mill. At the right, a bulk hopper car is being filled from the finished-product silos. Shipments of bagged bentonite are loaded from the packing installation just inside the door at the left.

LABORATORY WORK is all-important to the quality control program, which encompasses every step of the process, from the pit to shipping. Cal Geis is laboratory control analyst.

SUPERVISORY. John McKean, plant manager, heads the impressive and meticulously controlled operations at Colony.

oil well grade, taconite bentonite, and chemical grade.

These and special products must meet rigid and frequently varying customer specification. For example, some consumers want a material with very low viscosity; others are at the opposite pole, and demand the property of high viscosity. To accommodate such variations, the reason that production is "controlled from its source" becomes readily apparent.

As a further protection for customer requirements, consistent availability of material is assured through the provision of a large, well-stocked warehouse. Thus, the severe Wyoming winter weather which occasionally brings operations to a halt for days at time will not disrupt customer service. About 50 percent of the shipments from Colony are in bulk; the balance is bagged, and almost all is by rail. Most of the bulk material is consigned to the recently developed market in taconite processing on the iron range. The rest of the output is about evenly distributed among chemical, foundry, and oil drilling applications.

Quality Control The importance of the laboratory in this scheme of things cannot be overstressed. It has already been noted how proper identification of material which varies from section to section in the pit is critical to the raw material recovery and handling phases of the operation. Making the tests for those purposes, plus the constant quality checks of a wide range of finished products is of the utmost importance to serving the market.

The Colony laboratory is provided with several thousand dollars worth of equipment with which the staff can make the required determinations. Among the many tests run are mulling, sieve, pH, viscosity, moisture content, CaO content, liquid limit, specific gravity, adsorption, fusion point, dispersion, and filter loss. Each is significant alone or in company with others in meeting varied product requirements.

Markets Despite the fact that industrial applications of bentonite first started to attract interest to any degree in 1924, the material has enjoyed an impressive growth in number and importance of uses. Among these are soil fertilization; water purification, impedance, and softening; dewatering; foundry practice; oil well drilling; sizing and filling of paper; and also for washing compounds, soap and cosmetic fillers, paints, and ceramics.

Several interesting areas of potential application are under investigation. Some of these are in explosives, sizing of cotton, lubricants, plastic bonding, cement admixture, and wood preservation. These are but a few of the innumerable uses to which bentonite researchers have turned their attention.

Management The impressive operations of the new Colony plant are headed by John McKean, plant manager. Paul Douglas is plant supervisor, and Cal Geis is laboratory control analyst. The plant crew is comprised of 10 men, and production is carried out in two or three shifts per day and five to six days per week in accordance with demand.

Company officials who led the development of the installation include John Daniels, president; J. C. Konen, vice-president, engineering; and A. Dorfmueller Jr., division manager.

Nova Scotia Plant Reopened For Diorite Processing

The Georgeville, N. S., plant of Maritime Rock Products, Ltd., will be reopened soon.

Diorite quarrying was started last year at Georgeville near Antigonish, on Nova Scotia's Northumberland Strait shore, but operations were halted before shipping was complete because of labor difficulties, loading problems, and a grading dispute.

Lime Needed in Fertility Plan*

Nitrogen application, high crop yields are depleting the lime supply in the soil

By KEATS VINING

LIME still tops the list as one of the most needed items in a good soil-fertility program. In fact, the declining use of lime is beginning to worry soil scientists. They point out that high crop yields and heavy use of nitrogen fertilizer are increasing the need for additional lime.

Nationally, we are using close to 25 million tons of lime annually. Soils men estimate we should be using close to 80 million tons each year to keep soils in top shape for producing those high yields year after year. That means we are not even close to supplying our estimated lime needs.

Cost of lime is an important aspect to many farmers. Actually, Dr. S. A. Barber, Purdue agronomist, says you can figure lime costs will average about one dollar an acre a year. This means an extra bushel of corn will pay the lime costs.

Dr. Barber says it is hard to imagine that a soil needing a lime application will not return at least that extra bushel of corn.

Another way to look at liming is from the long-range returns. Dr. O. J. Attoe, University of Wisconsin soil specialist, says each dollar invested in lime will give you a *$5 to $15 return* over a period of years.

He says many Wisconsin tests with liming soils indicates you get roughly a *$15 return for each dollar* spent on liming over a 10-year period.

What should your liming procedure be? E. D. Longnecker, Michigan State University extension soil specialist, recommends soil testing every three or four years to find out when it is liming time on a field. Soil testing for lime needs is easy and inexpensive.

Benefits of Liming

What does lime do to the soil? According to Mr. Longnecker, lime helps balance soil nutrients, lowers soil acidity, and makes phosphorus and molybdenum more available to crops. Lime also helps avoid bad effects from excess aluminum, iron, and magnesium.

Dolomitic limestone, which contains magnesium, pays off when this element is in short supply in the soil. Dolomitic limestone needs fine grinding, as it is harder and less soluble than calcium limestone.

Lime gets little credit for two important jobs it does besides correcting soil acidity, says Mr. Longnecker. It supplies magnesium and also calcium, both important nutrients, to plants. One ton of alfalfa hay carries away as much calcium as contained in 110 lb. of limestone.

Moreover, it helps soil bacteria that make other plant nutrients available and keeps the soil in good physical condition. There is better root growth; more crop residues are left; and a better soil structure in general is found on limed soils.

Lime also aids nitrogen-fixing bacteria on legume roots. These bacteria take nitrogen from the air. They save the farmer money, for a ton of alfalfa hay has as much nitrogen as six dollars' worth of ammonium nitrate fertilizer.

Soil Acidity

A question often asked in connection with lime is "What is soil acidity?" It is a chemical condition caused by small quantities of various acids—carbonic, nitric, sulphuric, and phosporic—all in the soil.

A far greater part of acidity in the soil is caused by hydrogen that is held on the surfaces of clay and humus particles. An acid soil keeps crops from getting enough of certain nutrients they need and permits them to get too much of others.

Liming a soil moves or changes it toward an alkaline (opposite of acid) state. The change is brought about by calcium and magnesium (if a dolomitic limestone is used) by replacing the hydrogen in the soil particles and in the soil solution.

To indicate whether a soil is acid, neutral, or alkaline, the term pH is used. If a soil is neutral, neither acid nor alkaline, its pH is 7.0. Smaller numbers such as pH 5.0 indicate acidity. The smaller the number, the more intense the acidity. Numbers greater than 7.0 denote alkalinity.

Crops and pH Ranges

Crops vary in their pH preferences, but generally the highest soil reaction for a given crop involves considerable range of pH.

Practically all field crops yield best at a slightly acid-to-neutral soil reaction—pH 6.5 to 7.0.

Other crops vary decidedly with respect to acid tolerance. The results of many experiments suggest classification of crops according to their pH preference or tolerance.

Some of the least acid-tolerant plants are alfalfa, asparagus, barley, beans, peas, red clover, sugar beets, and sweet clover. These need a pH range of 6.3 to 7.5.

Medium acid-tolerant plants are corn, grasses, birdsfoot trefoil, and wheat, with pH tolerances of 5.5 to 7.0.

More acid-tolerant plants are buckwheat, oats, potatoes, raspber-

(*Continued on page* 218)

*Abstracted by permission of *Prairie Farmer*.

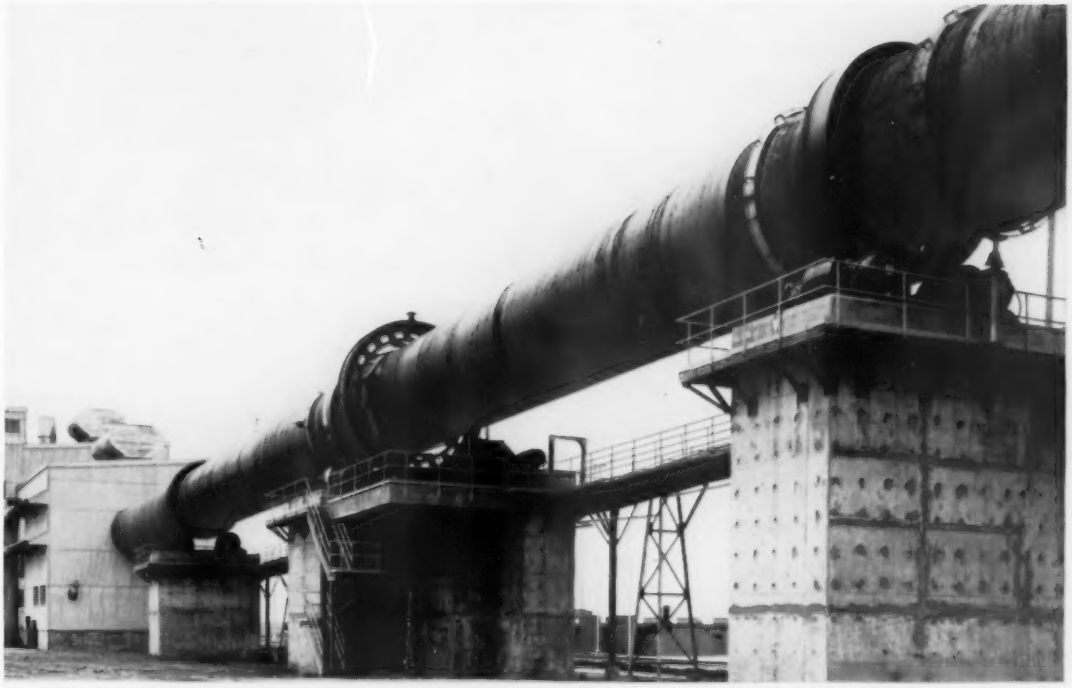
pit and quarry

THE BASIC MAGAZINE IN A BASIC INDUSTRY

THIRTY-THIRD ANNUAL CEMENT MILLS SECTION

JULY 1961

SMIDTH ROTARY KILNS



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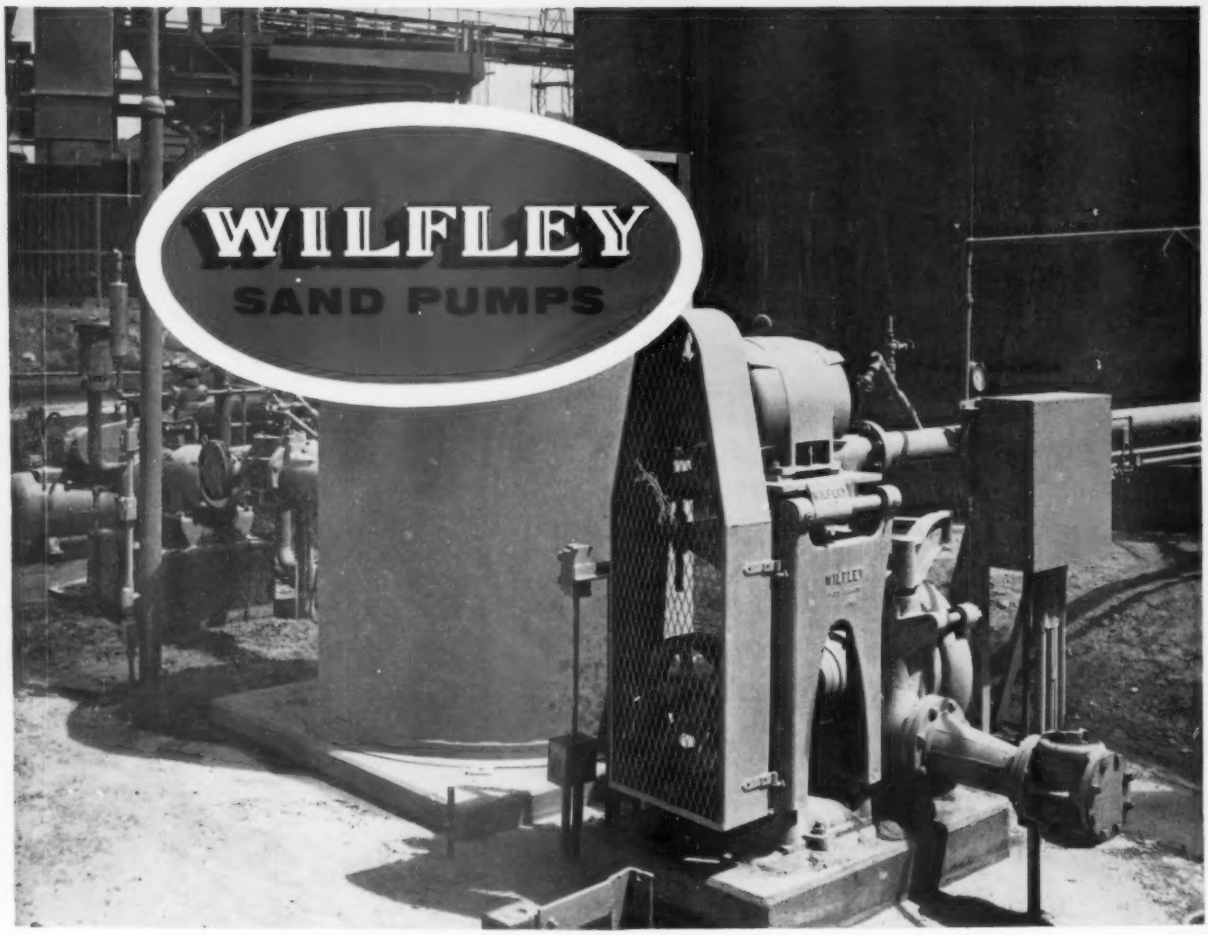

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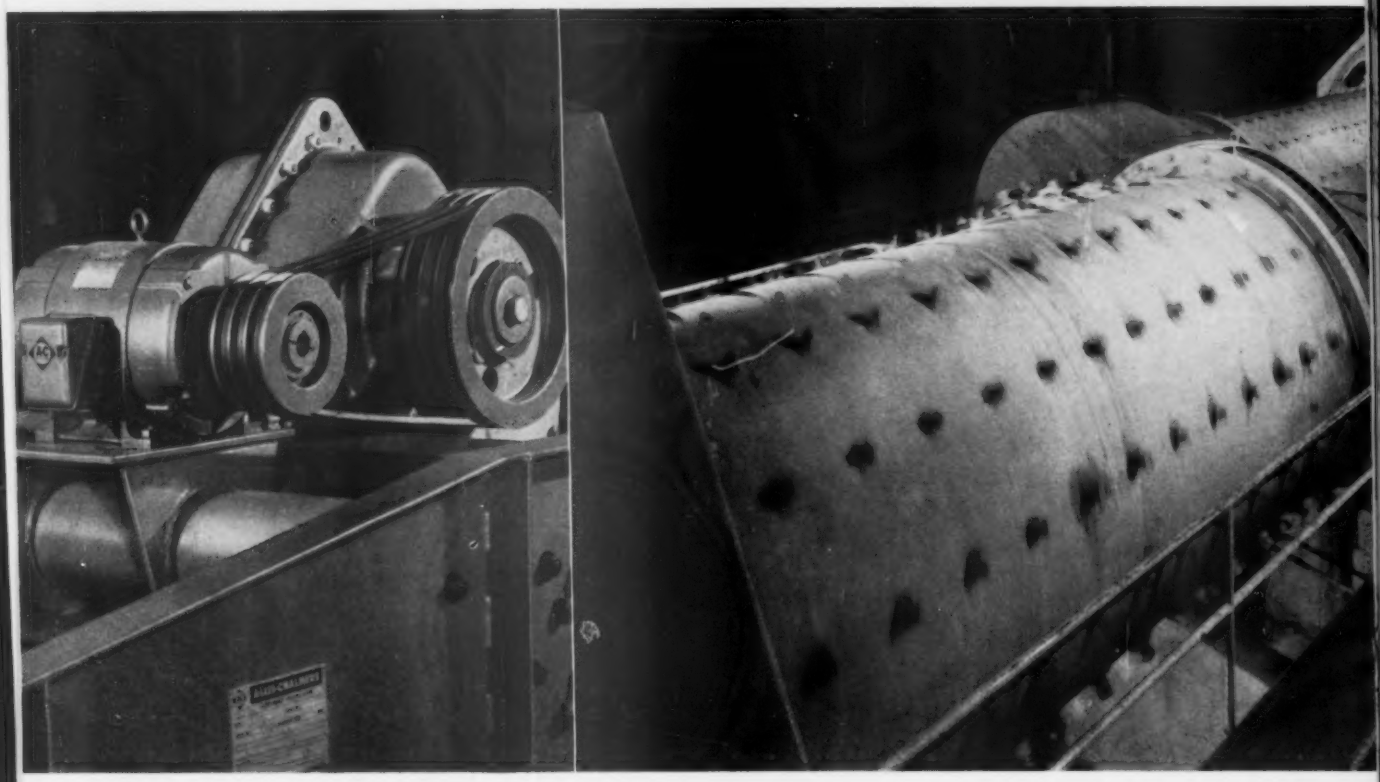

Low-Head screen with direct mounted motor: A completely integrated screening unit is this new, LOW-HEAD horizontal screen with direct mounted motor. No supporting structure, no belt tensioning or alignment problems plus headroom saving, smooth starts and stops, easy accessibility for maintenance. Another example of engineered screening from Allis-Chalmers.

Rod mills debut in cement "society": Two Allis-Chalmers overflow rod mills are being used by a Michigan cement company to wet grind cement raw materials in open circuit. Several other cement companies too are using them — all report substantial savings in labor and power requirements and a more uniform product. Biggest advantage of rod milling is preparation of sized feed for the tube mill, permitting the BALLPEB mill to grind satisfactory rotary kiln feed in open circuit.

Which of these productive ideas could be working for you?

Screen with direct mounted motor. New ideas in kilns. Grinding mills that cut cement production costs. These examples demonstrate the extra value that is standard with A-C...the greater efficiency and the added productivity which are yours when you buy A-C products, systems and services. Call your Allis-Chalmers representative for details on A-C "worth-more" features. Or write Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

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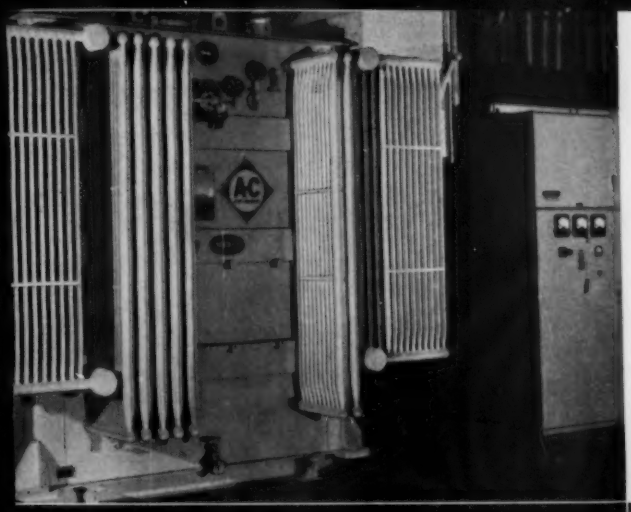
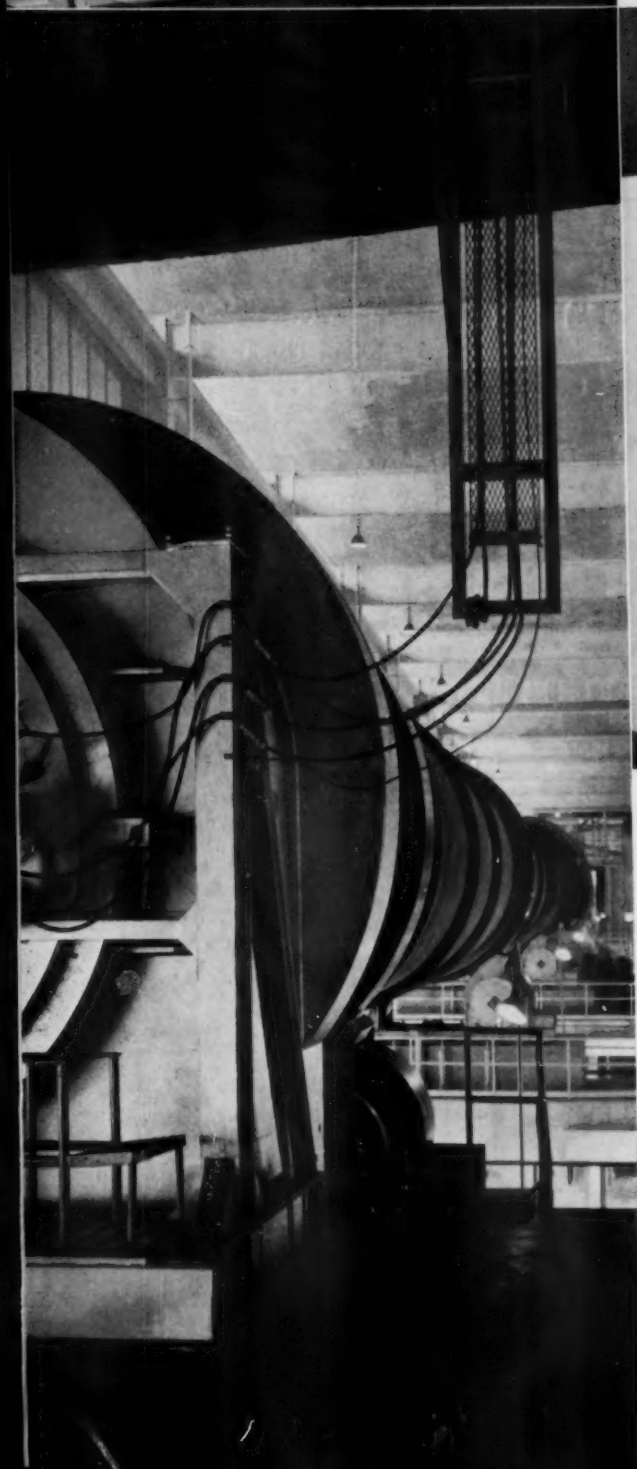
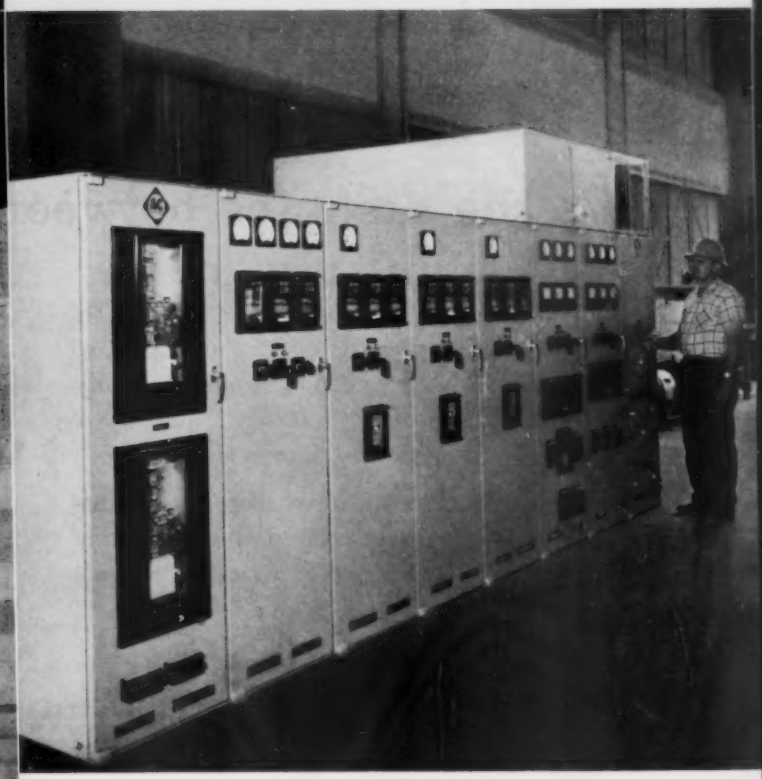


A-C transformer offers multiple benefits: Located close to the load center in a Midwest cement plant, this 5000-kva CHLOR-EXTOL filled transformer provides reduced power losses, better regulation, and flexibility for expansion. Types available also include oil-filled, liquid-filled, and dry-type units (both sealed and open).

Lowest height, easiest access — 5-kv metal-clad switchgear. Just 72 inches high . . . you get eye-level instrumentation, shoulder-height accessibility. Has front-accessible current transformers — maximum compartmentation and dead-front construction for greater safety. Choice of stored energy or solenoid operated circuit breakers.





New A-C kilns have many innovations: Latest A-C rotary kilns feature: expansion type ring gears, removable firing hood faces, hydraulic thrust mechanisms, dual drives to overcome critical speed vibrations and independent hydraulically adjustable carrying mechanisms to keep roller faces in proper contact with riding ring face. New ideas in kiln engineering mark each new kiln from A-C.

ALLIS-CHALMERS PRODUCTS: Look to Allis-Chalmers for compressors, controls, crushers, earth-moving equipment, electrical distribution equipment, engines, generators, industrial systems, kilns, lift trucks, mills, motors, pumps, rectifiers, screens; thermal, hydro and atomic electrical generating equipment; tractors, transformers, unit substations.

ALLIS-CHALMERS

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It's the distance between your plant and ours.

All a matter of numbers and geography, of course. Bemis has seven plants making multiwall bags for the cement industry. And they're strategically located, as the map shows.

So, it follows that we have more bag plants closer to more cement plants than does any other manufacturer. And *short delivery hauls mean fast service.*

Also, a *network* of plants means flexibility . . . if one of our plants gets in a bind, there's another conveniently close to take care of your needs promptly.

As for sales-service, there are 29 Bemis sales offices . . . another big plus in efficiency and convenience.

To round out the picture, Bemis makes any type multiwall bag that the cement industry may need. Like to try our product and service? Just call or write.

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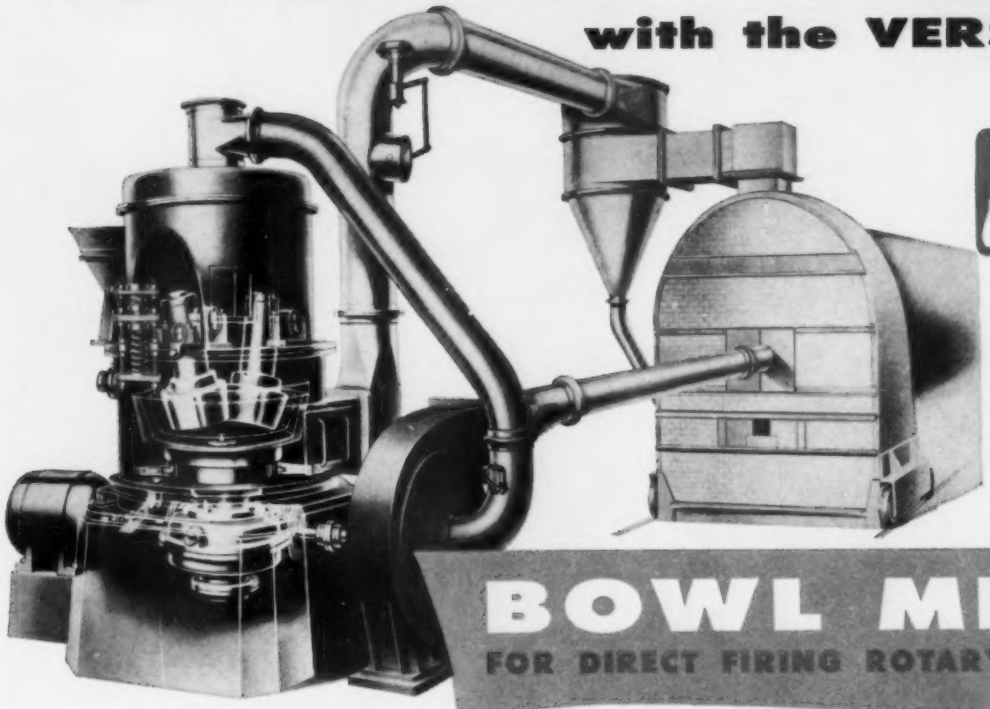

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FOR DIRECT FIRING ROTARY KILNS

After more than 25 years of top-level performance in the cement industry, these modern Bowl Mills still lead the field in pulverizing economy and kiln burning efficiency. Because of time-proven advantages, more and more operators of cement, lime and dolomite kilns are equipping their new plants with Bowl Mills . . . or converting their old plants to Bowl Mill installations.

The principle of incorporating a revolving bowl and stationary grinding rolls, with no metal-to-metal contact, provides wide range capacity at continuous 24 hour, noiseless, vibrationless operation. Availability is almost 100 per cent.

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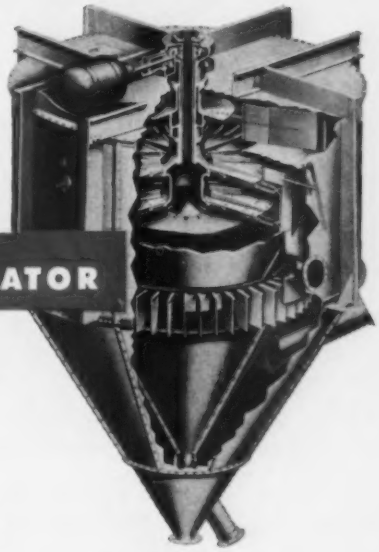

Double Whizzer Separator showing air openings.

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This unit, available in nine commercial sizes, is equipped with a patented revolving Whizzer, single or double type, and offers three general types of application.

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To all of the superior features of the KENNEDY Ball Tube Mill is now added the finest of mill drives.

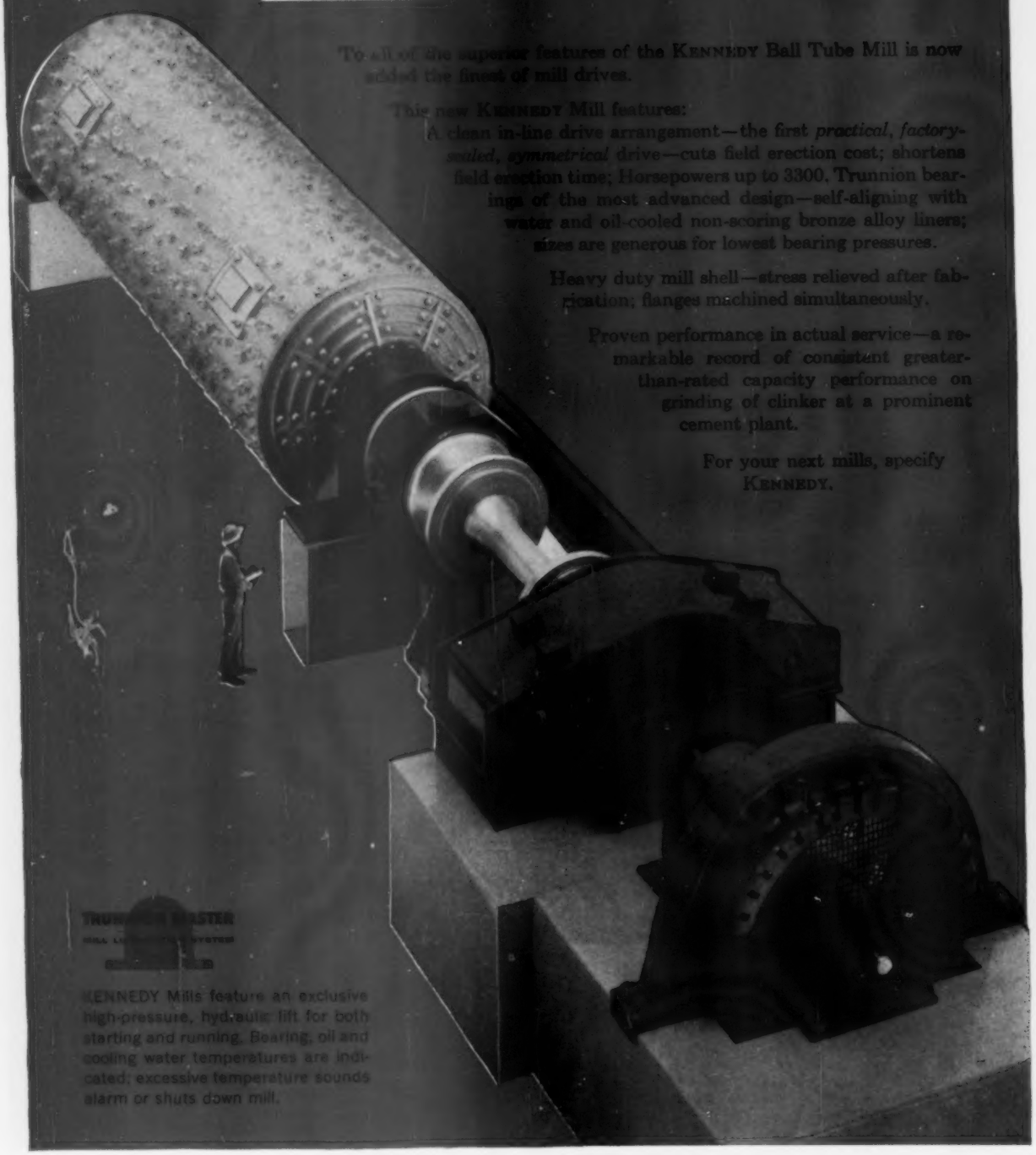
This new KENNEDY Mill features:

A clean in-line drive arrangement—the first *practical, factory-sealed, symmetrical* drive—cuts field erection cost; shortens field erection time; Horsepowers up to 3300. Trunnion bearings of the most advanced design—self-aligning with water and oil-cooled non-scoring bronze alloy liners; sizes are generous for lowest bearing pressures.

Heavy duty mill shell—stress relieved after fabrication; flanges machined simultaneously.

Proven performance in actual service—a remarkable record of consistent greater-than-rated capacity performance on grinding of clinker at a prominent cement plant.

For your next mills, specify KENNEDY.



KENNEDY Mills feature an exclusive high-pressure, hydraulic lift for both starting and running. Bearing, oil and cooling water temperatures are indicated; excessive temperature sounds alarm or shuts down mill.

KENNEDY VAN SAUN

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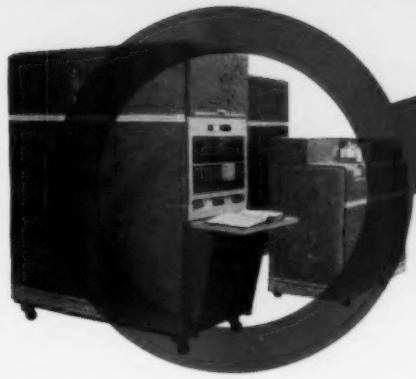
Primary & Secondary Gyratory Crushers • Jaw Crushers • Roll Crushers • Impact Breakers • Hammer Mills • Rod & Ball Mills • Kilns & Kiln Accessories • Dryers • Scrubbers • Screens • Pneumatic & Mechanical Conveyors • Complete Crushing, Lime, Cement & Carbon Paste Plants. • Research & Testing Service.

Another reason for the superiority of

KENNEDY ROTARY KILNS

KENNEDY has taken the *GUESSWORK* out of Rotary Kiln design by use of a modern digital computer to determine . . .

- HEAT TRANSFER
- FIRING EFFICIENCY
- OPTIMUM DIMENSIONS
- REFRACTORY REQUIREMENTS
- AUXILIARIES & CONTROLS



IBM 650 Data Processing System used by KENNEDY Engineers for Rotary Kiln Calculations.

KENNEDY [illegible]s the *more than 100 variables* in a kiln operation and in less than an hour solves the basic equations necessary to determine optimum design.

KENNEDY's already established reputation in kilns for . . .

- Lime, dolomite & magnesite burning
- Cement, wet or dry process
- Ore nodulizing
- Coke calcining

. . . is further enhanced by this new, more scientific approach.

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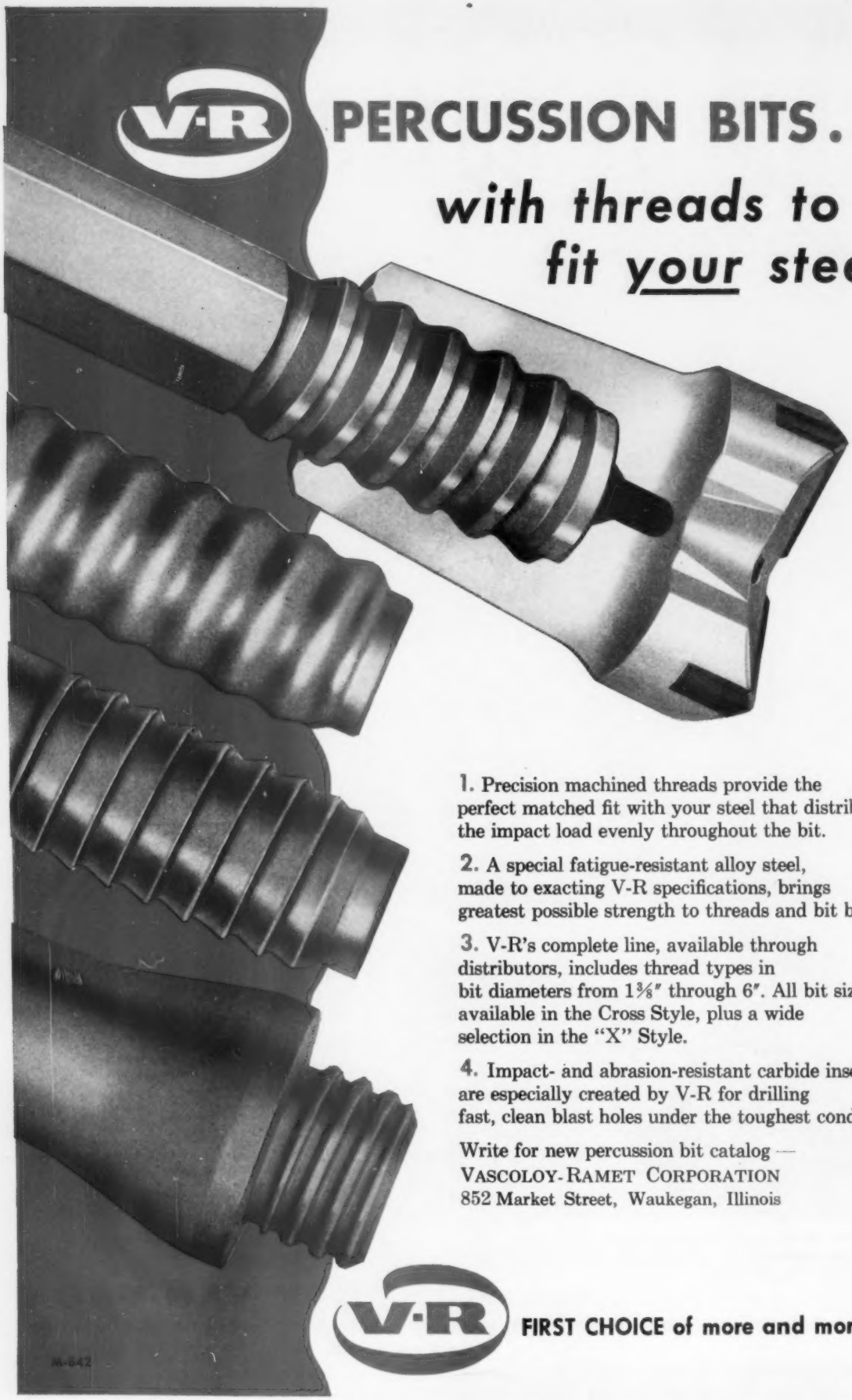

V-R PERCUSSION BITS...

with threads to fit your steel!

1. Precision machined threads provide the perfect matched fit with your steel that distributes the impact load evenly throughout the bit.

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3. V-R's complete line, available through distributors, includes thread types in bit diameters from 1⅜" through 6". All bit sizes are available in the Cross Style, plus a wide selection in the "X" Style.

4. Impact- and abrasion-resistant carbide inserts are especially created by V-R for drilling fast, clean blast holes under the toughest conditions.

Write for new percussion bit catalog —
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V-R FIRST CHOICE of more and more drillers

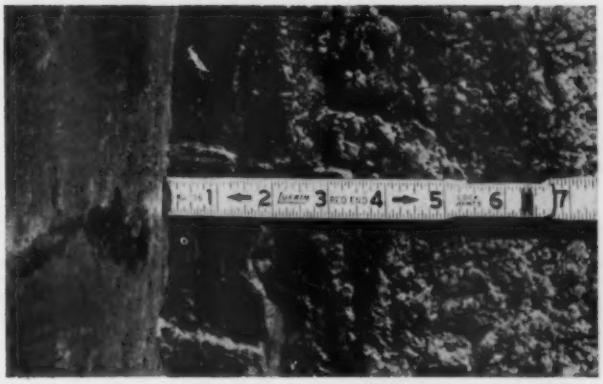
M-642

398 days between hot zone repairs

HOT zone refractories in this cement kiln "held the line" for 398 days between repairs . . . *substantially more than two times longer than usual!* A good portion of the credit for this outstanding run can be traced to a 15-foot panel of fusion-cast Corhart 104 refractory, located strategically at the heart of the hot zone.

The Corhart panel was installed in the kiln's most severe wear area to balance refractory life *throughout* the hot zone. Corhart 104 can do this because it is *not* a conventional refractory . . . it is a patented product made by Corhart's electric melting process. As a result, 104 resists spalling and chemical attack up to two or three times longer than conventional linings.

Corhart balance adds-up to longer continuous production runs,. lower repair costs, and much lower refractory-cost-per-ton-of-clinker. Investigate the benefits of Corhart 104 before your next repair. Write: Corhart Refractories Company, Incorporated, 946 Commonwealth Building, Louisville 2, Kentucky.



Closeup shows thickness and coating of Corhart 104 section after 398 days in operation. This is a high-capacity rotary kiln with a Lepol pre-heater system.

QUALITY ECONOMY ENDURANCE

CORHART REFRACTORIES COMPANY

Subsidiary of Corning Glass Works

The words "Corhart", "ZAC", and "Electrocast" are registered trade marks which indicate manufacture by Corhart Refractories Company, Incorporated.

ALEMITE ACCUMATIC CENTRALIZED LUBRICATION SYSTEM RESULTS IN $45,000 SAVINGS ON DUST COLLECTORS!

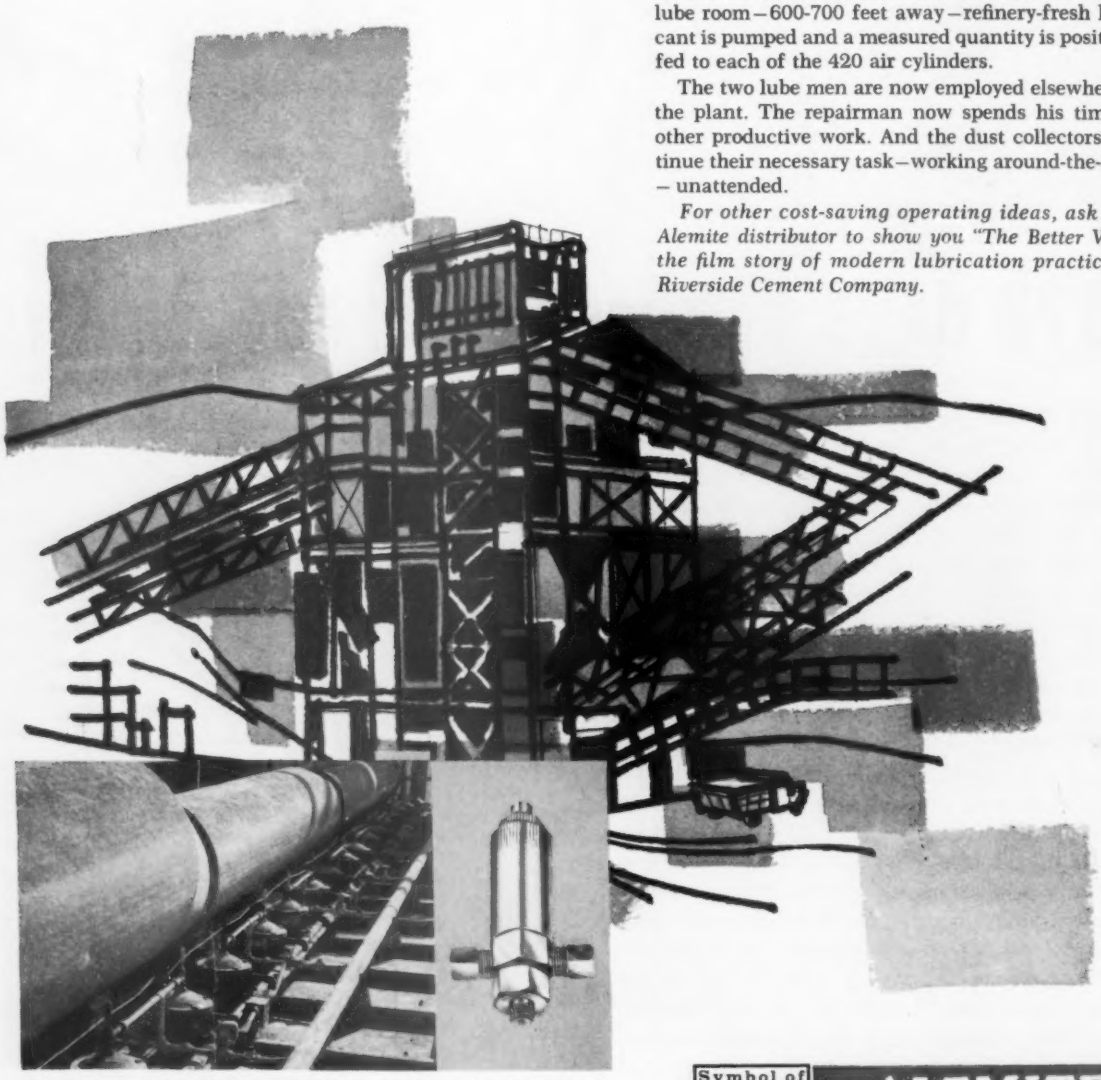
Around-the-clock protection and reduced operating costs key to Riverside Cement Company's modernization program.

Two lubrication men, a machine repairman and 50 extra air cylinders were needed to keep the Riverside Cement Company's dust collection system in operating condition. The lube men were kept busy hand lubricating the 420 air cylinder damper valves in the system. The repairman spent his time changing, replacing and rebuilding these cylinders.

Four years ago, Alemite, working closely with Riverside engineers, installed an Accumatic Centralized system on these cylinders. Now, from one central lube room—600-700 feet away—refinery-fresh lubricant is pumped and a measured quantity is positively fed to each of the 420 air cylinders.

The two lube men are now employed elsewhere in the plant. The repairman now spends his time on other productive work. And the dust collectors continue their necessary task—working around-the-clock—unattended.

For other cost-saving operating ideas, ask your Alemite distributor to show you "The Better Way," the film story of modern lubrication practices at Riverside Cement Company.



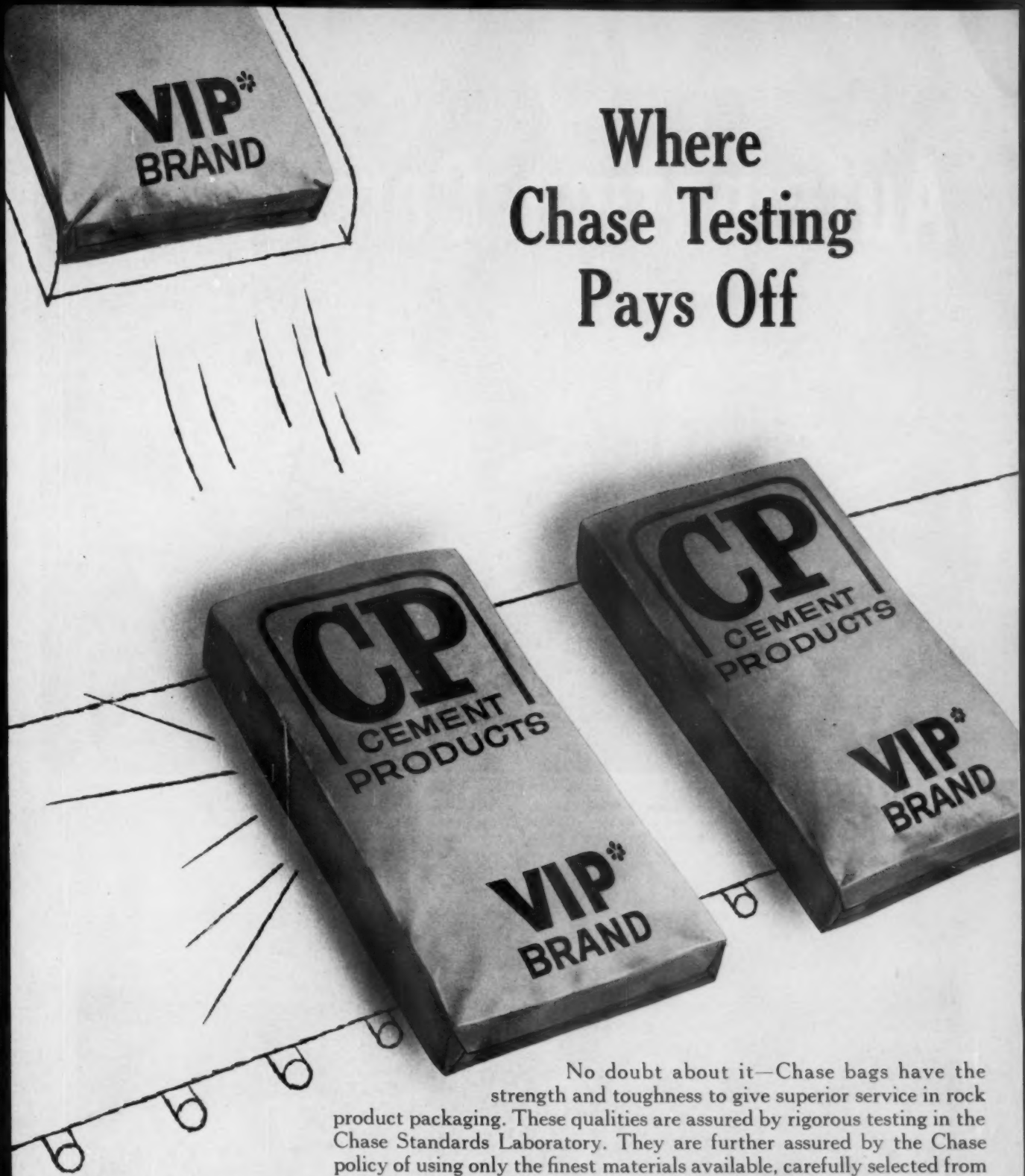
These 18 damper valves operating dust collector shaker mechanisms atop the secondary crusher building—plus 402 more throughout the entire mill—are lubricated by an Accumatic Type I system.

Symbol of SW Excellence

ALEMITE DIVISION
STEWART-WARNER CORPORATION

In Canada: Stewart-Warner Corporation of Canada, Ltd., Belleville, Ontario

Dept. S-71, 1850 Diversey Parkway, Chicago 14, Illinois



Where Chase Testing Pays Off

No doubt about it—Chase bags have the strength and toughness to give superior service in rock product packaging. These qualities are assured by rigorous testing in the Chase Standards Laboratory. They are further assured by the Chase policy of using only the finest materials available, carefully selected from the best of *many* market sources. Whatever type you need—stretchable, non-skid, creped or regular kraft . . . fully bleached, semi-bleached, colored outer sheets—Chase can give you the *right* bag of maximum strength, minimum bulk. You pay no more for the best bags, beautifully made and beautifully printed. Make sure you get them—from Chase. If you have a special packaging problem, call the Chase Man for cooperation in solving it.

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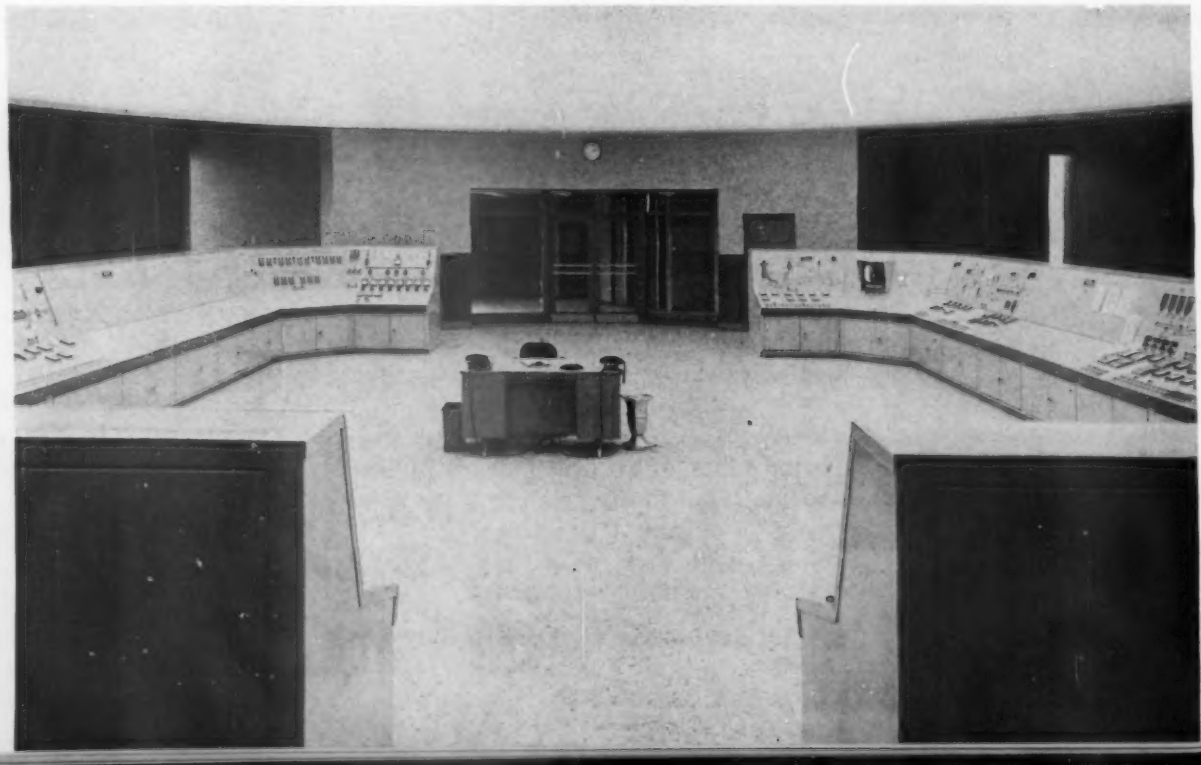
**A Chase Bag will make your product a Very Important Package.*

MULTIWALL BAGS · EXPLOSIVES BAGS · OTHER PACKAGING MATERIALS

Automation Concept--

Above:
AN AERIAL VIEW of Dewey Portland Cement Company's new cement plant near Tulsa, Okla. At the left are the truck- and car-loading silos and the packhouse. At the far right are the stone- and shale-crushing buildings and the quarry. The attractive laboratory-console building, the office, and the service building are in the foreground.



By WALTER E. TRAUFFER

Chief Design Factor

IN DEWEY'S NEW TULSA PLANT

ANOTHER ON THE SPOT report

THE new dry-process plant of the Dewey Portland Cement Company (Division of American-Marietta Company) at Tulsa, Okla., should be an important milestone in the manufacture of portland cement. This 4,000-bbl.-per-day operation combines simplicity and flexibility of design with one of the most complete instrumentation and control systems ever developed. Automatic control has been applied wherever possible, and continuing experiments are being carried on with other applications, some of which are new to the industry. All operating control through the finish-grinding department are grouped in a central console room with one technician, but localized manual concontrols are also provided. All instrumentation is of the electronic type, and the analog computer controls presently installed are so designed that digital computation equipment can be installed later.

The over-all concept of this plant was developed over a long period by Fred B. Hunt, vice-president in charge of operations. The Crosby Construction Company was commissioned to design a clean, modern plant with centralized control. The control systems and central control room panels were designed and manufactured by the Swanson Engineering & Mfg Co. Crosby also did the detailed design in co-operation with Dewey and American-Marietta engineers, and was the general contractor.

Construction of the plant was begun in June, 1959. The raw mill was started up on February 10, 1961, the kiln was fired on March 6, and finished cement was first produced on March 21. The official dedication of the plant was held on June 3, 1961.

The plant is located 5 miles east of the Tulsa city limits and only

Opposite page, bottom:
THE GROUP OF CONSOLE PANELS on which one console room technician can observe all equipment and process conditions and make the operating changes required.

Right:
THE X-RAY SPECTROGRAPH, which makes possible quick control of $CaCO_3$, silica, alumina and iron.

THE MEN BEHIND THIS PLANT. Fred B. Hunt, vice-president in charge of operations (right), developed the over-all concept. Arthur P. Hunter (center) is plant manager, and Harold L. Egger is assistant plant manager.

3½ miles from a bypass to the turnpike running northeast and west of that city. It is connected by a ½-mile siding to the main line of the Frisco railroad.

This single-kiln dry-process plant was designed for a clinker producing capacity of 4,000 bbl. per day with a kiln fuel (natural gas) consumption of 850,000 B.t.u. per bbl. As of May 1, after only 8 weeks of operation with the usual shutdowns, adjustments, etc., kiln output has been gradually brought up to 3,600 bbl., with an average 900,000 B.t.u. consumption. Both designed criteria have been approached for short periods and are sure to be reached or exceeded, but no crowding is being done. The crushing, grinding, and other departments are already known to have ample capacity. Only five men are required to operate nights and week-ends, including a shift foreman, a console room technician, a laboratory technician, a mechanical maintenance man, and a crane operator. The entire payroll is 85 men, including the above, on all shifts. The plant is currently producing portland cement types I, Ia, and II; but type III and mason's cement can also be made.

AUTOMATION CONCEPT

Probably the most interesting feature of this plant involves the instrumentation concept, which is based on providing continuous automatic control of all principal equipment and important process variables. To achieve this concept, according to A. P. Hunter, plant manager, all operating controls, except those for the packhouse and the bulk loading departments, are located in a group of console panels in one central control room. Here one console room technician can observe all equipment and process conditions and make the operating changes required.

This concept has already resulted in a more uniform product, the minimum of operating personnel, increased production, and immediate knowledge of equipment failure or erratic operations. The location of the control room adjacent to the plant chemical laboratory has provided a closer tie between the plant staff of chemists and the operating crew. The process controls have been closely integrated with analog computing loops to provide maximum stability to plant operation.

The console panels contain electrical and process control instrumentation which can be described briefly as follows:

Electrical instrumentation incorporates the push buttons, interlocks, ammeters, warning lights, and alarm horn system which permit starting and stopping of all electrical equipment throughout the plant. This electrical instrumentation also indicates any abnormal conditions, such as equipment failure, motor stoppage, excessive temperatures, high or low bin levels, etc.,—all of which will actuate flashing alarm lights located in the graphic panels and an alarm horn, to advise the console room technician of trouble.

The electrical controls also include equipment interlock and manual or automatic start-up. All relays timers, motor programmers, etc., are housed in the central console to facilitate system check-out and maintenance and to eliminate complex and costly wiring.

Process control instrumentation incorporates instrumentation to control the important process variables such as temperature, pressure, flow, etc. The instrumentation is, in general, of the electronic type, with the transmitter at the point of measurement (in the field) sending an electronic signal (10 to 50 milliamps) to the recorder and controller located in the console. Where automatic control is used, the respective controller (in the console) in turn transmits an electronic signal to a converter in the field, which converts this signal to a 3- to 15- p.s.i. air signal, that operates the final control device, such as a damper operator or a flow control valve.

When speed control is involved, the output signal from the controller (in the console) goes to an electronic speed control unit (in the field) which, in turn, varies the motor speed.

All process control instrumentation is provided with a "manual-automatic" selector switch to permit manual operation of each controller during start-up operations or during major upset conditions.

KILN INSTRUMENTATION

The major object of the instrumentation up to the kiln is to obtain the most uniform possible feed to the kiln. The primary object of the kiln instrumentation is to insure uniform quality clinker at optimum production and with minimum fuel consumption. In order to do this an effort was made by Swanson and the Dewey engineers to substitute instruments for the human element wherever possible in determining and controlling kiln operating conditions. Most of these applications are now working quite satisfactorily, while several others are still being worked on. Results obtained follow.

THE CLAY AND SHALE QUARRY being developed. The 5-cu. yd. electric shovel is loading one of the 35-ton side-dump tractor wagons.

Cooler Instrumentation Constant-flow, constant-temperature (constant B.t.u.) secondary air is essential for uniform kiln operation. Cooler controls making this possible are as follows:

A. The hood draft is being held constant by the variable-speed controller on the cooler vent fan speed.

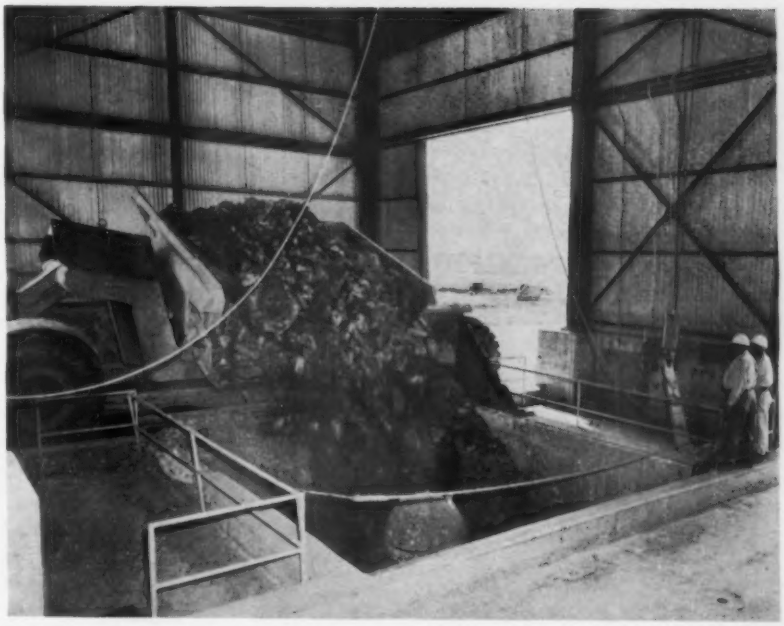
B. Cooler grate speed is controlled to maintain a constant, preset undergrate pressure in the first compartment of the cooler. The output of the pressure controller varies the grate speed through a Dynamatic speed control unit.

C. Constant air flow through the clinker bed in cooler compartment No. 1 by means of a venturi varying the damper of the fan is now being accomplished periodically on automatic control. Studies are still being made relative to optimum settings on this loop.

D. Automatic control of secondary air temperature by trimming of "B" (cooler grate speed) is now being successfully accomplished.

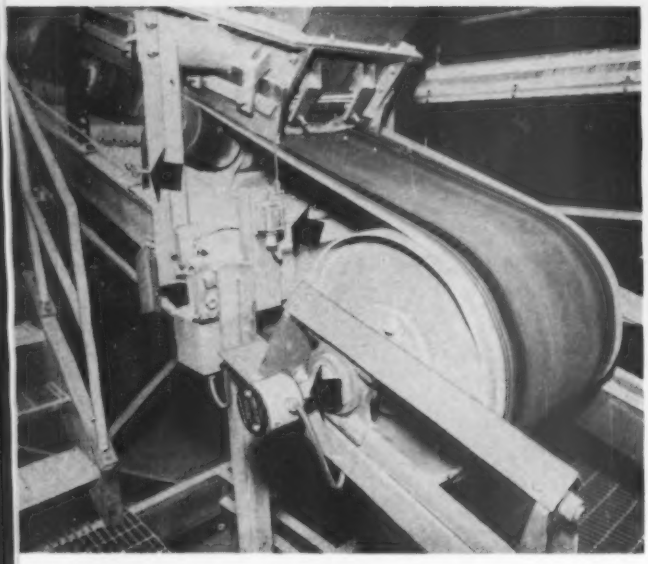
Kiln Fuel Control Efforts have been made to maintain constant burning zone conditions by measuring and controlling at its optimum value the temperature of the material immediately ahead of the burning zone. This temperature is measured by three thermo-couples in a ring 175 ft. from the discharge end of the kiln. The averaged temperature is transmitted through a product controller, an automatic selector, and a Bias and Span unit to the fuel flow controller.

A decrease in the product temperature will increase the fuel rate, so that the burning zone temperature is increased in preparation for the



TRACTOR WAGONS (35-ton) can discharge from either side into the 42-65 gyratory primary crushers.

THE SHALE DRYING CIRCUIT, which is used only during wet seasons. The crushed shale conveyor at the right goes to storage in the background.



SAFETY FEATURES ON THIS BELT CONVEYOR include a zero-speed switch on the tail pulley, limit switches on the belt alignment and, at the left, safety stop cables on each side of the conveyor.

colder material. This has worked satisfactorily for short periods but requires a "balanced" kiln with respect to raw feed and uncoated thermocouples. It is anticipated that once raw feed composition has been stabilized for good burning characteristics, and a special cleaning device now under fabrication has been installed, this instrument loop will function continuously.

Fuel-Air Ratio Control Control of the fuel-air ratio by varying the kiln feed end draft has been done successfully in two different ways, through a feed end pressure (draft) recorder controller or through the exhaust fan speed controller. The latter method is preferred as it is more direct.

Oxygen Control The above fuel-air ratio works well and gives relatively constant oxygen readings except when there is a changing resistance to air flow due to rings or material buildup of any kind. As long as the kiln is stable, the oxygen controller successfully adjusts the ratio controller to increase the feed end draft and maintain the desired 1 percent excess oxygen.

Exit Gas Temperature Control The gas temperature at the kiln exhaust fan is being successfully controlled at the desired 600 deg. F. temperature by varying the spray water. The gas temperature controller signals the water spray flow controller, which adjusts the valve in the water spray line. In the event of water failure or excessively high exit gas temperature, the fuel flow valve automatically goes to minimum firing position.

Kiln Speed Control There are two kiln speed control systems. One is a separate control loop designed only to hold a constant pre-set kiln speed. This is in operation and works well. However, no effort has yet been made to use the system installed for automatic control of kiln speed, which can "trim" the kiln speed slightly, upon variations in material temperature at the discharge of the "crosses."

Further time is required to evaluate the results of this control. Swanson thermocouple slip ring devices are used to measure this product temperature, as well as the product temperature ahead of heat exchange "cross."

Other Features Additional features of the kiln instrumentation include the following:

A. A kiln shell scanner for measuring kiln shell temperature in the area of the 'burning zone" has been installed and is functioning satisfactorily. This unit has been designed with a special two-speed control to reduce return time to initial scanning position to the minimum.

B. A water spray system which automatically sprays clinker at the final apron conveyor if the temperature reaches 250 deg. F.

C. High-temperature alarm for both of the above points and numerous other temperature recording points.

D. A high-low oxygen alarm, along with a combustible alarm.

E. A low-pressure alarm for the plant air supplied to the kiln feed end water spray system.

F. Closed-circuit television has been installed in the central control console to enable the operator to view conditions in the kiln. This has proven very satisfactory.

KILN FEED SYSTEM

A Fuller Airlift feed system is provided with a variable speed screw withdrawing from a constant-head bin. Dust from the cyclones and baghouse can be returned to the systems or wasted.

Raw Feed System The raw feed system incorporating "feeding by weight" to the kiln is working very well. The Weightometer speed is constant unless changed by the console room technician, when on automatic control. Any deflection of the weighbeam varies the speed of the Dynamatic drive of the constant-head feed screw to maintain the desired feed rate.

Dust Return Feed System Dust is returned to the kiln from the cyclones and bag house at predetermined, constant rates. The control loops are similar to those for new raw feed, except that the feed rate controllers regulate the speed of Fuller rotary feeders under the two dust bins.

A further control which has not yet functioned involves the entire feed system being controlled to maintain a constant-equivalent feed rate, on the basis of constant B.t.u. input to the kiln. This system takes into consideration the theory that the B.t.u. requirement for burning dust is less than that for raw feed.

Miscellaneous In addition to the kiln instrumentation described for the central console room, various indicators are included in a small panel on the kiln burner floor to indicate hood draft, feed end draft, secondary air temperature, feed end temperature, fuel flow, primary and secondary air flow, and pressures under the four cooler compartments. These are for an assist during start-up operations.

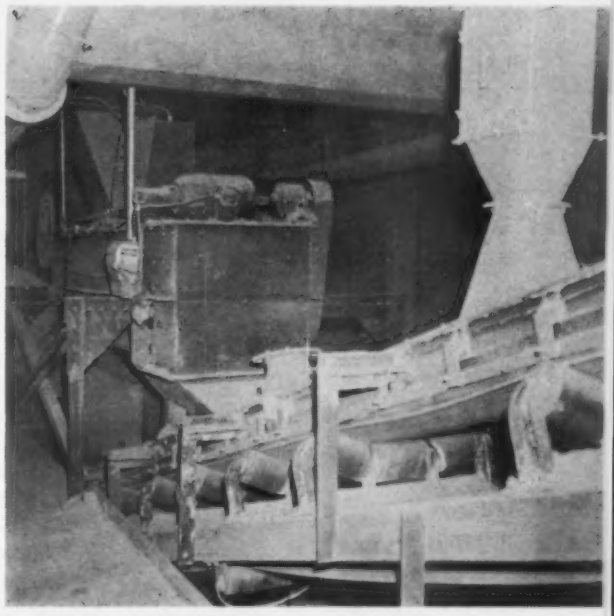
OPERATIONS

Quarry The property of 1,500 acres is in the Louisville limestone, which is being worked by other plants over a wide area. This varies from 20 to 90 ft. in thickness on the property but averages 40 ft. where the quarry is being developed. It ranges from 80 to 96 percent $CaCO_3$ and its average of 1 percent MgO creates no problems. Its alumina-iron ratio is favorable for Type II cement manufacture, requiring only 3 percent sand and 1 percent iron. The deposit is somewhat broken with some thin beds of shale.

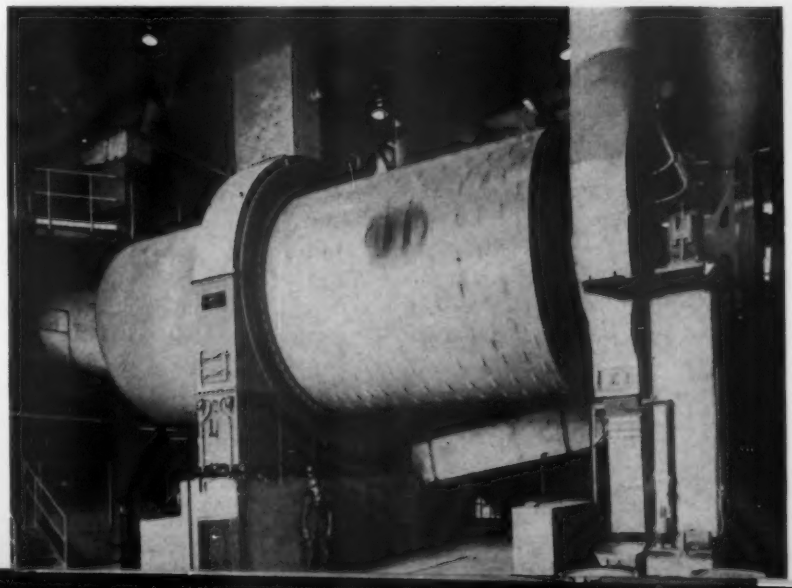
The limestone is overlain by 8 to 12 ft. of cap rock, a broken mixture of limestone and clay. Under the limestone is at least 100 ft. of Labette shale, which is hard and dark blue-grey in color.

An excellent blend is now being obtained by drilling the cap rock and limestone, in one operation. A 15- to 20-ft. face of shale is being worked separately. Drilling is being done with a Joy Heavyweight Champion using 7⅞-in. bits. During development no set pattern is being followed, but shots average 45 holes in two or three rows. No secondary breakage has yet been required, but this will be done by secondary shooting. The stone and shale are loaded separately into two 35-ton Easton side-dump wagons with Caterpillar DW-20 4-wheel tractor units. A P&H 1500 electric shovel with a 5-cu. yd. dipper loads the limestone, and a P&H 1025 die-

Above:
STORAGE. The 100- by 600-ft. storage building for limestone, shale, iron ore, sand, clinker, and gypsum. All rehandling is done with one crane that has a 4-cu. yd. bucket.

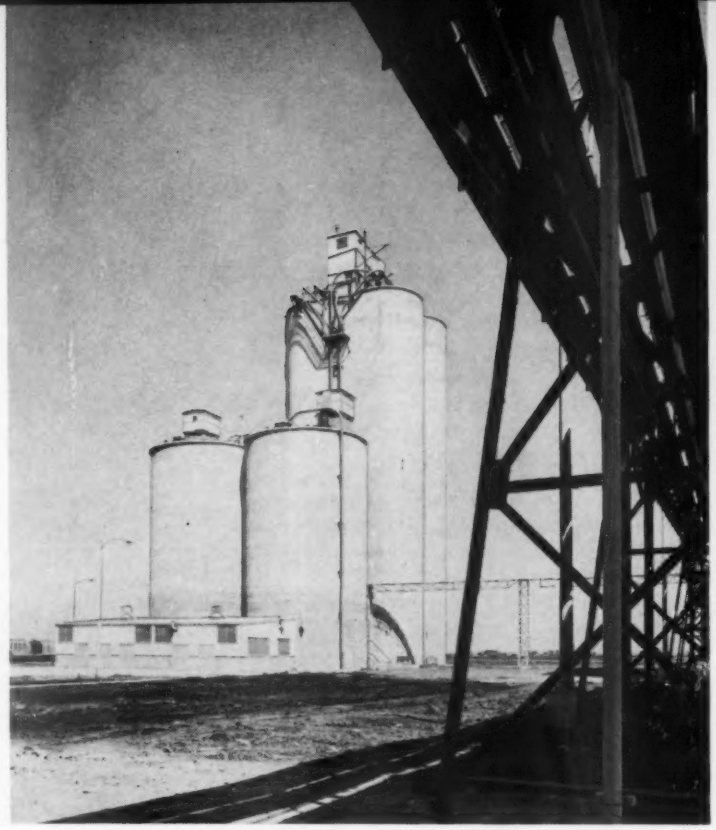


Right:
THE WEIGHING FEEDER for limestone discharges on the same raw mill feed conveyor with shale, iron ore, and sand.



Right:
RAW MILL. This is the 12- by 28-ft. raw mill, with the 7-ft. long drying compartment at the left. The slide shoe bearing is at the left, with a small holding bearing at the discharge end.

sel shovel with a 3-cu. yd. dipper loads the shale. The wagon units haul the limestone about 1,000 ft., and the shale somewhat farther, to their respective primary crushers.



Limestone The limestone is dumped from the wagons on either side of the 250-hp. Allis-Chalmers 42-65 Superior gyratory crusher. The latter has the Hydroset mechanism for adjustment of opening and compensation for wear while in operation but this has been used much more often to eliminate plug-up. As a result, there has been only one plug-up in five months of operation requiring anything more than the conventional use of the 4-ton overhead hoist and stone hook. A 40-ton P&H overhead crane is used to handle equipment and parts.

A 60-in. Pioneer apron conveyor feeds the minus 6-in. crusher product onto the first of a series of five belt conveyors. A 600-hp. Pennsylvania CB-15-50 reversible impactor in closed circuit with a 7-ft. by 13-ft. 8-in. Allis-Chalmers Ripl-Flo screen (with a single rod deck) reduces the stone to 100 percent minus ½-in. Belt No. 2 is observed by a television camera, and the secondary crusher is protected by an R.C.A. metal detector. A tripper on the No. 5 conveyor discharges the limestone into the covered storage building.

Shale Shale from the quarry is discharged from trucks on a 5-ft. by 20-ft. 6-in. apron feeder and reduced by a 600-hp., 60-in. Hammermills, Inc., non-clog hammermill. The apron feeder has dynamatic control with torque limit and automatically slows down when the mill motor load goes up, as in the case of large rock. A belt conveyor feeds the product to the wet shale area in the storage building.

A drying circuit for the shale is used only when needed during wet seasons. A Webster variable-speed apron feeder and a 24-in. belt conveyor feeds the shale from storage to the 8- by 80-ft. Allis-Chalmers drier. This is gas-fired by a Coen burner, and the exit temperature is automatically maintained between 400 and 450 deg. F. This is the first automated process control in the plant, with the gas and air flow mechanically linked together and controlled by the temperature at the discharge hood. Exhaust air is vented by Western Precipitation cyclones. The drier can reduce the moisture of the shale from 20 percent to 5 percent at the rate of 85 t.p.h.

A 60-hp. Pennsylvania CDL-5-38 impactor, preceded by a 4- by 10-ft. one-deck Allis-Chalmers scalping screen, reduces the shale to ¾-in. minus. It is then conveyed back to storage.

Sand, Iron Gypsum There is a separate unloading station for sand and iron ore. These are discharged from cars to a hopper, and a 24- belt conveyor feeds to separate 300-ton bins in the storage building. A similar system feeds gypsum to storage.

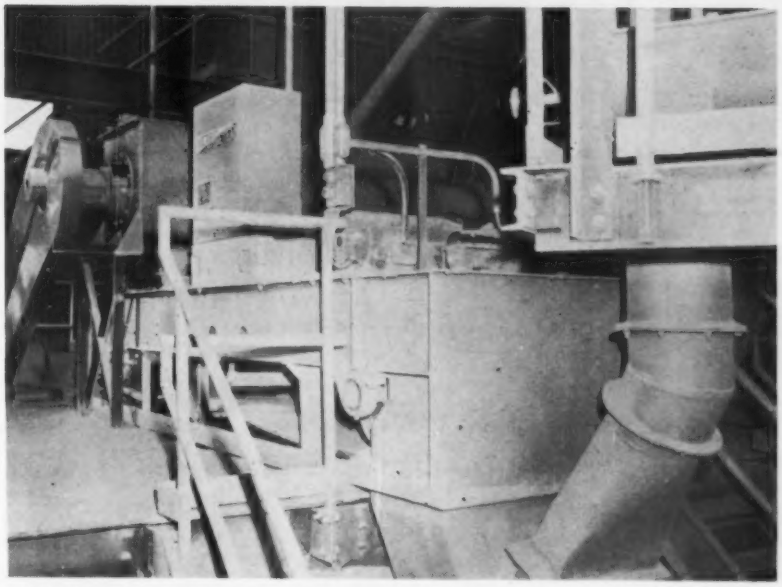
Storage The 100- by 600-ft. material storage building has raw material and clinker storage capacity for 1½ to 2 months' operation of the plant. There are separate sections for 37,000 tons of limestone, 12,000 tons of shale, 220,000 bbl. of clinker, and 5,500 tons of gypsum. A P&H 11-ton overhead traveling crane with a 4-cu. yd. Blaw-Knox clamshell bucket does all rehandling to and from storage. Bucket operation is controlled by a single "joy stick" lever.

Raw Grinding Raw materials are rehandled by the crane from storage to mill feed bins—440 tons for limestone, 260 for shale, 93 for iron ore, and 220 tons for sand. These materials flow through rack-and-pinion gates to Merrick Feedoweights under each bin. These are ganged together electronically, so that once the ratio is set by the laboratory, the console room technician can operate only one control to vary the combined feed rate as needed. The sand, ore, and shale are discharged on one 24-in. belt conveyor, and these, with the limestone, are discharged on the 24-in. mill feed belt conveyor.

The proportioned raw materials are discharged into the end of the 12- by 28-ft. F. L. Smidth Tirax raw-grinding and drying mill. This unit has a 7-ft. drying compartment

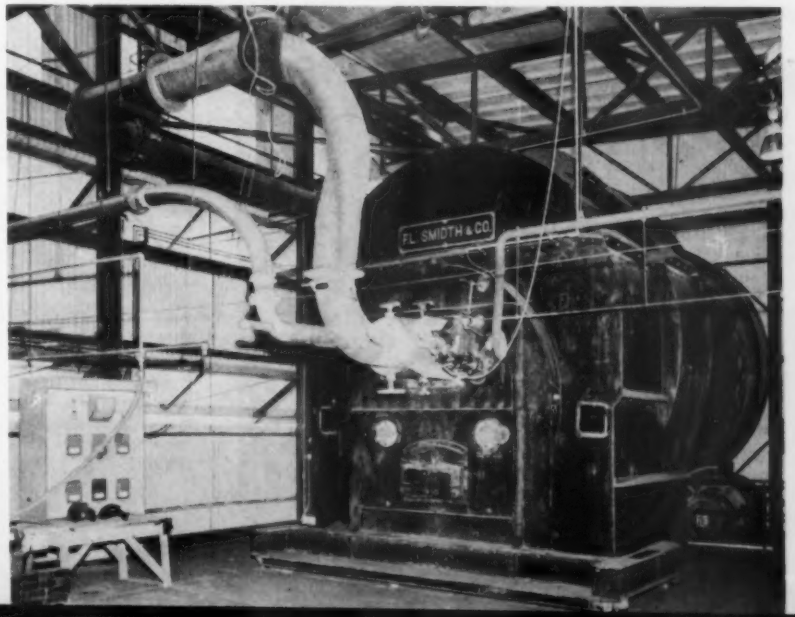
Above:
THIS VIEW of the 12- by 425-ft. kiln shows the feeding building in the center, with the kiln-gas baghouse at the right. In back of the latter are the raw mix storage silos.

Opposite Page:
STORAGE AND BLENDING. The raw material storage and blending system, with the two 40-ft. diameter homogenizing silos in front and the four 28-ft. diameter storage silos.



THE KILN FEED SYSTEM, with the raw material screw and weigher in the background. Proportioned recovered dust is discharged from the screw at the right to the feed mix paddle screw.

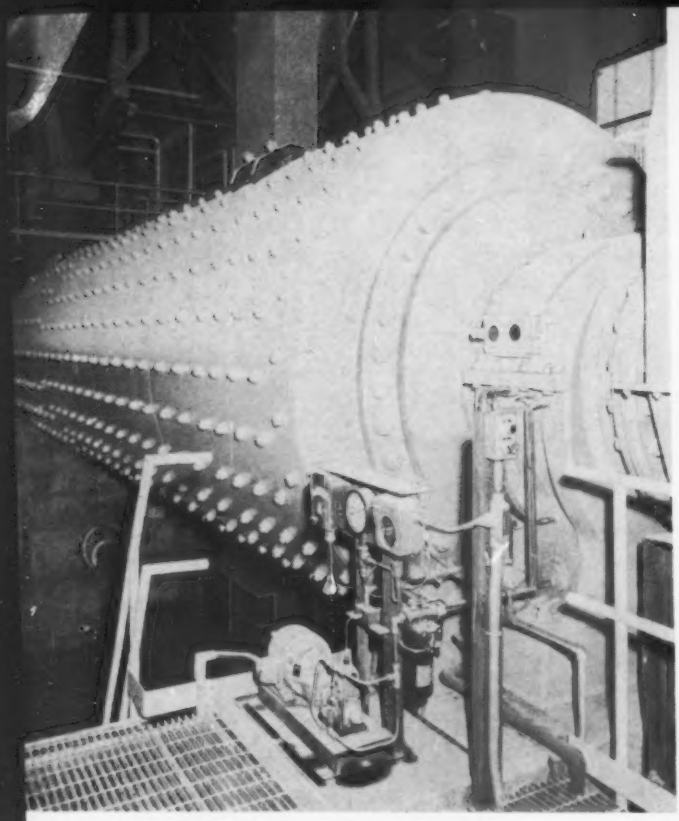
THE KILN HOOD, with the gas burner and temperature and draft recording instruments. Only a basic indicating board is required as the controls are in the main console room.



with lifters and no ball charge, and a 21-ft. grinding compartment with a 175,000-lb. charge of Sheffield Molycop balls graded from 3 in. to 1 in. The designed charge consists of 18,000 lb. of 3-in., 37,000 lb. of 2½-in., 35,000 lb. of 2-in., 35,000 lb. of 1½-in., and 50,000 lb. of 1-in. balls. Additional 3-in. balls are added once a month. With this load, the mill is rated at 100 t.ph. At present a 5/6 ball load is being used (146,000 lb.), which is grinding at the rate of 80 t.p.h. to a fineness of 85 to 87 percent through 200-mesh.

The mill has slide shoe bearings near the middle and a small "holding" bearing at the discharge end. It is driven at a speed of 1.75 r.p.m. by a 1,500-hp. Elliott synchronous motor through a Symetro gear drive and a special Smidth coupling. All mills are provided with electric inchers and the Smidth oil floating system on starting. Electrical mill load controllers installed on each mill elevator circuit will automatically control the feeders.

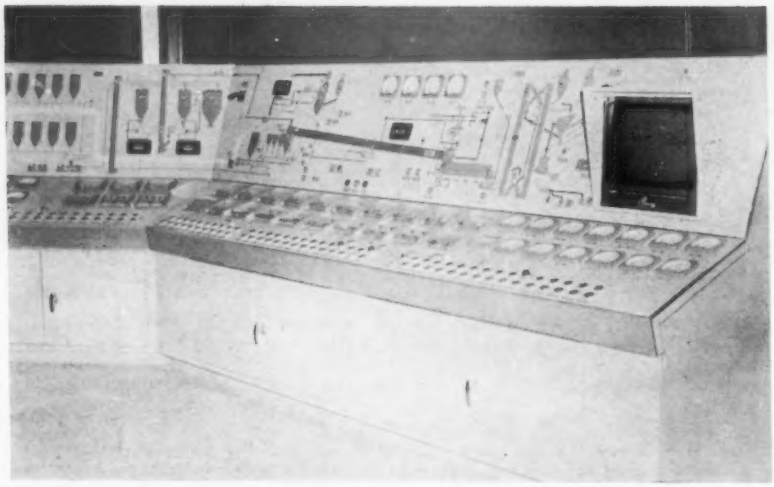
Mill product is discharged through the mill trunnion *via* a 19-in. Fuller-



FINISH MILLS. One of the two 10- by 34-ft. 2-compartment finish mills with its 18-ft. separator above, left, and the automatic lubricating system in the foreground.

Huron Airslide, a Link-Belt bucket elevator, and another Airslide to the 18-ft. diameter Raymond single-whizzer air separator. The standard closed-circuit flow is used, rejects being returned by an Airslide to the feed end of the mill.

The heat for "drying in the mill" is provided by a 25,000,000 B.t.u./hr. Todd heater with a gas and oil burner and flameout control. The temperature in the drying compartment of the mill ranges from 800 to 1,100 deg. F., depending on the moisture of the raw material—usually 2½ to 3½ percent. The gas valve is automatically controlled by the temperature of the air going into the mill, and the temperature of the air at the outlet of the mill controls the amount of air going to the heater *via* a damper, etc. Hot air from the heater also goes direct to the separator—there is automatic control of the separator exit temperatures, which regulates an air bleed-in damper ahead of the separator. There is also a separate hot air branch line to the Norblo 36,000-c.f.m. bag dust collector for automatic humidity control. An emergency bleed-in lets in cool air ahead of the Norblo bag collector when its inlet temperature exceeds 225 deg. All of the controls are located in the control room. Start-up and shut-down of the unit, including facing of the furnace, is accomplished from this point.



The ground raw material from the separator and collectors goes *via* Airslide to two 10-in. Fuller-Kinyon pumps (one stand-by) which pump the ground raw material to the raw mix silos. This material has a moisture content of about 0.3 percent.

Above:
ONE PANEL of the main control console (for the kiln) contains both electrical and process control instruments for the kiln and all related equipment.

Left:
THE PRODUCT THERMOCOUPLE INSTALLATION, 175 ft. from the discharge end of the kiln, is a major factor in automatic control of the kiln.

Raw Blending The raw mix blending and storage system consists of two 40-ft. diameter by 60 ft. high (above flat-bottom) blending or homogenizing silos and four 28-ft. diameter by 105-ft. high (above cone) storage silos. Each blending silos has a capacity of 1,570 tons or 5,240 bbl., and the storage silos hold a total of 2,400 to 8,100 bbl. each, with another 630 tons in their interstice. Completely full, this is the equivalent of 48,800 bbl. or an 11 days' supply for the kiln.

In normal operation the raw material is pumped to one blending silo while the other is feeding the kiln or the storage silos. This is possible because of the uniformity of the raw material and the accurate mill feed control. Only in case of an off mix, the mill product could go first to the storage silos and thence to a blending silo. The kiln is fed from the storage silos only when changing over to another type of cement, or in an emergency. Three of them are usually used for Type I cement and one of them for specials. There is complete flexibility for blending and recirculation among all six silos. One of three 9-in. Fuller-Kinyon pumps is used for recirculation, one is for kiln feed, and the other is a spare.

The Fuller Airmerge blending system is used in the two blending silos, one quadrant being mixed while the other three are held in suspension. The quadrants are blended successively at 20-minute intervals. Each silo is provided with 1,200 c.f.m. of air 25-lb. pressure for blending by a Fuller C-225 compressor and with 400 c.f.m. of air at 20 lb. for aeration. The constant mixing action within the silo results in a mixture of uniform chemical and physical composition. No difficulty has been experienced in holding the kiln feed within 0.2 percent of the desired 78.6 percent $CaCO_3$ content in spite of the fact that the quarry is still in the development stage.

Kiln Feed For feeding the kiln, the Fuller Airlift feed system is used with some elaborations. The raw material is pumped from the silos to a Fuller Airlift equipped with high- and low-level Bindicators. A blower supplies air for aeration on the conical bottom of the bin and to a porous pad under it. The aerated cement goes up a central pipe into the constant-head feed bin, from which excess material overflows a weir back into the main bin. A 24-in. diameter screw withdraws from the constant-head bin and discharges to a Merrick Weightometer. This automatically varies the screw speed to give the desired feed rate. The material is then discharged into a feed mix paddle screw which feeds the kiln.

Recovered dust is blended in with the raw feed at the rate produced. Three bins are provided alongside the kiln feed bin—for baghouse dust, cyclone dust, and waste dust, which are received *via* Fuller-Kinyon pump or screws and elevator. Both the baghouse and cyclone dust bins have high- and low-level Bindicators and feed to separate Weightometers. They also discharge *via* bucket elevators to the feed mix paddle screw at the desired ratio to the raw material. The ratios between the three feeds can be adjusted as desired; but once set, they are automatically maintained.

All of the dust is being used in ordinary cements, but when low-alkali cement is being made, all the cyclone dust—5 to 6 t.p.h.—and some of the baghouse dust, up to 2 t.p.h., is used. The remaining baghouse dust goes to the waste dust bin.

The intimately-mixed kiln feed is discharged from the mixer through a spout which enters the end of the kiln at an angle to within 10-in. of the lining. This helps to hold down dust.

In an emergency it is possible to bypass the large Airlift feed bin and feed directly from the raw silos to the constant-head feed bin.

Kiln The 12- by 425-ft. F. L. Smidth rotary kiln is mounted on five sets of 54-in. diameter by 34-in. rollers and has a slope of ⅜ in. per ft. It is driven by a 200-hp. Elliott d.c. motor through a Falk reducer and single-helical girth gears. The d.c. speed control provides for kiln speeds of from 20 to 80 r.p.m. At present that speed is 60 r.p.h.

The kiln is lined throughout with 6-in. refractories and has a 45-ft. long, 6-chamber Smidth heat exchanger. These crosses are of alloy steel and divide the cross-section of the kiln into radial segments for maximum exposure of the material to the hot gases. Beginning at the feed end, the kiln is lined as follows: 14 ft. of Mexico 40 percent alumina brick, then 45 ft. of the same in the heat exchanger section, 286 ft. of Morex 40 percent alumina, 20 ft. of Alumex 70 percent alumina, 50 ft. of Kaiser Unitab basic brick in the burning zone, 5 ft. of Canadian Refractories basic brick, and 5 ft. of A.P. Green 70 percent alumina.

GOT A WELDING PROBLEM? ?

on the following pages

READ...

1. How McKay 11018 Electrodes meet the need for high tensile and yield strengths at Material Service Corporation in helping make stronger dipper sticks.

2. Why McKay Hardalloy 44 is the ideal Electrode for overlaying carbon steel and austenitic manganese steel parts, subjected to heavy impact and severe abrasion.

M-4

THE McKAY COMPANY

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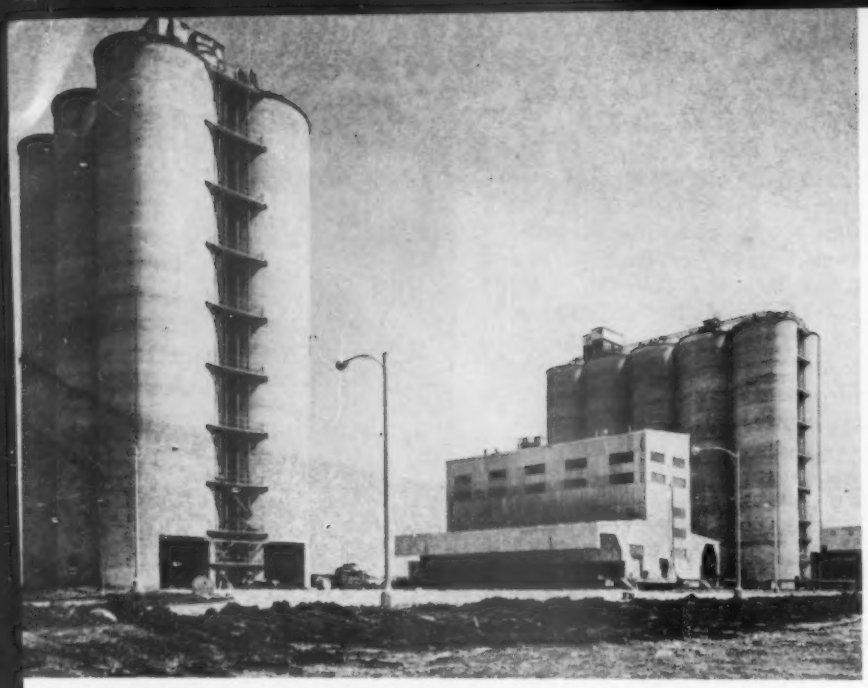

LOADING SILOS. The six truck bulk-loading silos (left) and ten regular and bulk car-loading silos (right) hold 350,000 bbl. of cement. The packhouse is between the silos.

BAG PACKERS. One of the four 4-tube bag packers whose feed system is the final point in the plant automation concept.

Firing The kiln is fired with natural gas through a Coen combination gas/oil burner with ambient primary air. The gas has a B.t.u. content of 1,040 to 1,050 B.t.u. per cu. ft. It is purchased from the Oklahoma Natural Gas Company, under a "first interruptible contract" which carries dump rates and the near certainty of no cutoff. There is oil stand-by storage and equipment for the kiln and the raw mill heater.

Kiln Gases The kiln exit gases are cooled by an F. L. Smidth water spray system at the discharge end of the kiln. This consists of a 1½-in. heat-resisting stainless steel pipe projecting about 2 ft. inside the kiln. Its 1-in. automizing spray nozzle uses 550 c.f.m. of compressed air at 80-lb. pressure to atomize up to 45 g.p.m. of water at 100-lb. pressure. With the specific heat of the air 0.25 and the water 1.0, this results in more cooling with less increase in the exit gas volume. Complete atomization is necessary, so that the water is converted instantly into superheated steam. This system is estimated to be reducing exit gas temperatures about 1,200 deg. F. (at feed end) to 600 deg. (at exhaust fan) without interfering with heat exchange to the raw material.

Exit gases are handled by a 165,000-c.f.m. Green Fuel Economizer Co. fan, and dust is collected by a Western Precipitation cyclone-baghouse combination. The Multiclone 24VD-36-6 cyclone installation consists of 36 tubes 24-in. in diameter. The Thermoflex baghouse has 924 Menardi silicone-treated glass bags 12 in. in diameter by 25 ft. high. These bags have a 17 permeability rating and a temperature rating of 550 deg. F. but are operating at 600 deg. The entire system is rated at 99.5 collection efficiency by the manufacturer, but is apparently exceeding this rate. All baghouse dust collected is returned to the kiln feed department by a 5-in. Fuller-Kinyon pump.

Clinker Cooling Etc. Clinker is discharged from the kiln to the 850 Fuller horizontal-grate clinker cooler, which is of standard design, with four compartments. The grate has variable-speed Dynamatic drive, controlled by the undergrate pressure at the No. 1 or hot compartment. A 25-hp. fan supplies cooling air to this compartment, which supplies secondary air to the kiln. The temperature of this air is automatically held at the desired level by "override" on cooler grate speed.

A 125-hp. fan supplies cooling air to compartments 2, 3, and 4, with manually-controlled dampers. A 75-hp. variable-speed fan exhauts from the cooler through a Western Precipitation Multiclone.

The cooler has an integral hammermill crusher at its discharge end. A 36-in. Webster apron conveyor feeds the clinker to a Link-Belt bucket elevator, with another as standy-by. A 5- by 12-ft. Allis-Chalmers Ripl-Flo screen scalps clinker to a 3½ by 51 Hydrocone gyratory crusher. This system can be bypassed but is used regularly in order to increase the capacity of the

finish mill. The resulting minus ½-in. clinker is carried to storage by a 30-in. Webster apron conveyor and a 24-in. belt conveyor with tripper. A Merrick Weightometer records clinker output.

Kiln Control The primary kiln control is the product themocouple, 175 ft. from the discharge end of the kiln. This temperature is held between 1,650 and 1,700 deg., F., resulting in 1,450 deg. gas and 1,050 deg. material temperatures at the cross, 2,900 deg. in the burning zone (radiomatic on brick), 600 deg. at the draft fan and in the bag house.

Secondary air from the cooler is 750 to 850 deg. F. 0_2 is held at 1½ percent. Pressures are 4½ to 5 in. water gauge under the No. 1 compartment of the cooler, 4 to 4½ in. under No. 2, and 2½ in. to 3 in. under the No. 3 and 4 compartments. Hood draft is carried at about .05 in.

Finish Grinding Clinker and gypsum are fed by the crane from storage to the feed bins for the two finish-grinding mills. There are two 1,550-bbl. clinker bins, and between them is a single 140-ton gypsum bin—providing material for more than 8 hours' operation of both mills. There is a Merrick Feedoweight under each clinker bin and two under the gypsum bin, one for each mill. These units proportion these materials onto Link-Belt drag conveyors to each mill. At the consoles these feeders can also be adjusted to any ratio desired by the laboratory and the rate of feed only can be varied by the console room technician.

There are two 150-ton bins for limestone for making masonry cement. These have Feedoweights which discharge on the same drag conveyors and are also under the same automatic control. Any air entraining or grinding additives are fed onto these conveyors, but these are separately controlled.

The blended feed is discharged through the trunnions into the two 10- by 34-ft. F. L. Smidth 2-compartment finish mills. Each mill has a 200,000-lb. ball charge. Colorado Fuel forged steel balls are used in the first compartment, the designed load consisting of 23,000 lb. of 3-in., 23,000 lb. of 2½-in., and 17,000 lb. of 2-in. balls. Sheffield Molycop balls are used in the second compartment, consisting of 37,000 lb. of 1-in. and 100,000 lb. of ⅞-in. At present only ⅝ of the designed load is being used. With this load each mill is grinding Type I cement at the rate of 150 bbl. per hour to a fineness of 3,400 sq. cm./gm. Blaine.

These mills have conventional trunnion bearings. They are driven at the rate of 18.8 r.p.m. by a 1,500-hp. Elliott synchronous motor through a Symetro gear drive and a special coupling.

The product of each mill is discharged through the trunnion *via* an Airslide, Link-Belt bucket elevator and Airslide to an 18-ft. dia. Raymond double-whizzer air separator. The standard closed-circuit flow is used with cooling in the separator. Separator rejects go back to the feed end of the mill by spout.

Outside air drawn through the separator normally cools the finished cement adequately. The cement is discharged onto an Airslide with a side discharge gate to the hopper of a Fuller-Kinyon pump. If additional cooling is required—usually in hot weather—the cement is discharged off the end of the Airslide and into an F. L. Smidth water-cooled cement cooler. The cooled cement is fed by Airslide to the pump.

The air from each separator is drawn through Norblo scalping cyclones and 31,750-c.f.m. Norblo bag-type dust collectors. The collected dust goes to the same Airslide to the pump.

As 8-in. Fuller-Kinyon (with a spare) can transport 400 bbl. per hr. of finished cement from both mills to the storage silos. There is also a 7-in. pump, so that if one mill is making special cement, or both mills are on different special cements, each pump can operate efficiently at more than half capacity. Cement is never pumped direct to the packhouse.

Cement Storage The pumps discharge the cement to any of ten rail bulk-loading and storage silos or to any of six truck bulk-loading silos in a separate group

McKAY 11018 ELECTRODES 1

. . . help make a stronger dipper stick in welding T-1 steel

"McKay 11018 Electrodes and T-1 steel were combined to produce a shovel dipper stick in our shop at substantial savings," said Mr. Ernest Escobar, foreman of the welding division of Material Service Corporation. "This dip stick should outlast the shovel."

Material Service operates plants and quarries throughout the nation, producing sand, gravel, limestone rock and agricultural lime. The Lockport shops are responsible for maintenance and repair of all barges, locomotives, earth-moving machines, cranes, dredging equipment and freight cars.

The McKay Company's full range of Electrodes and Welding Wires meet the widely diversified requirements of the Material Service Corporation.

Whatever your electrode needs may be; for mild or stainless steel fabrications or hard surfacing applications, it pays to investigate McKay.

WRITE FOR new catalog on the "Welding of Mild Steels." It catalogs specifications, operating characteristics, properties, uses other data about McKay Mild Steel, Low Alloy & Low Hydrogen Electrodes.

M-5

THE McKAY COMPANY

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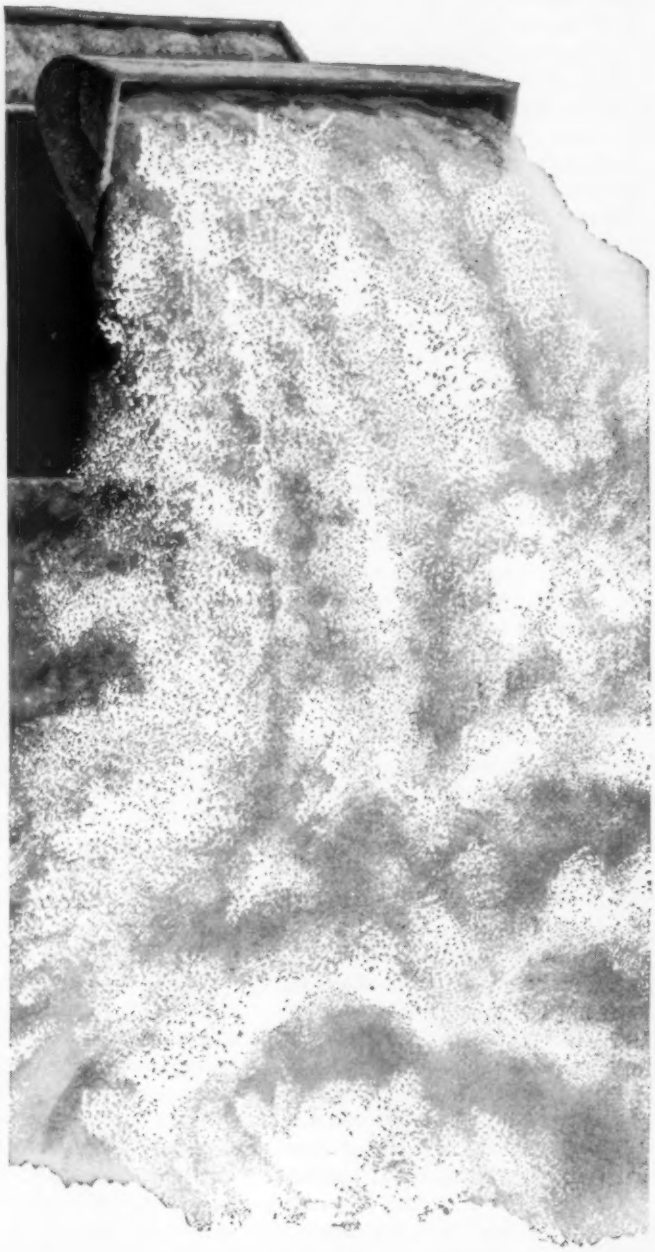
STILL FIRST*

REX BUCKET ELEVATORS

***First Choice in Cement Mills for...**

CAPACITY
DEPENDABILITY
ECONOMY



Six years ago CHAIN Belt introduced this completely new concept in cement mill elevators...a concept based on the needs of modern cement mill operations. It was the first really new idea in bucket elevators in more than 20 years.

These new elevators met all the demands you made: CAPACITY to match the requirements of modern closed-circuit grinding systems... DEPENDABILITY in all components to eliminate production-halting breakdowns...ECONOMY in both initial and operating costs.

So well have Rex Bucket Elevators answered these demands that more Rex Elevators are working in cement plants than any other type. The Rex engineering concept of *balanced design*, with the strength of each component matched to the other, is still the standard that competitors are seeking to reach.

Why not investigate the cement mill elevators that are *first* because they *last*! Write for your copy of Bulletin No. 311-1600, CHAIN Belt Company, 4604 W. Greenfield Ave., Milwaukee 1, Wisconsin. Rex Chainbelt (Canada) Ltd., Toronto and Montreal.

REX®
CHAIN BELT COMPANY

having a total storage capacity of 350,000 bbl. The ten 32- by 146-ft. rail silos consist of one row of five silos 117 ft. high above the cone, each with a capacity of 24,-900 bbl. for feed to the adjacent packhouse; and a row of five over-track silos 96 ft. high above the cone (20,700 bbl. capacity) for direct bulk car-loading. There are four 5,500-bbl. capacity interstices.

Cars are loaded under the "over-track" silos and moved out for weighing on a 75-ton Fairbanks-Morse track scale, located outside the silos. These silos have double hopper bottoms, and a long collecting screw conveyor can feed from them and from any of the four interstices to an 8-in. Fuller-Kinyon pump. This pump can recirculate the cement among any of the ten silos in this group or feed it to the six truck bulk silos or to the packhouse.

Cement is withdrawn from the five storage silos by a portable 8-in. Fuller-Kinyon pump. The latter usually feeds to the packhouse, but it can also recirculate the cement among the ten silos or pump it to the six trucks bulk silos. When pumping to the four 4-tube St. Regis FC-150 packers in the packhouse, the pump and its compressor are started and stopped automatically by upper- and lower-level Bindicators on the packer bin in use. Cars and trucks are loaded by means of Power Curve telescopic conveyors which take the bags to the point of loading. There is storage for 400,000 palletized bags.

The six truck-bulk loading silos are 32 by 146 ft. and 100 ft. high above the cones. These are "over-truck" units, each holding 21,400 bbl., and having two 5,225 bbl. interstices. Under each row of three silos is a 75-ton Fairbanks-Morse truck scale; and trucks are loaded "on the scale" by a telescopic combination fill and vent spout. Also under each row of silos is an 8-in. Fuller-Kinyon pump, fed by Air-slides, which can recirculate the cement among these six silos or feed it to the other ten silos.

Laboratory The laboratory building houses the plant laboratories, adjacent to the console room, and the company's general laboratory for all three plants. Included are completely equipped analytical and physical laboratories, a separate balance room, a grinding room, a concrete service room, and an X-ray room. Only $CaCO_3$ is now controlled, but with the X-ray Spectrograph, silica, alumina, and iron, etc., will also be controlled.

The kiln feed is checked every hour for $CaCO_3$—liter weights and free limes are also run around the clock—and a daily analysis is made. Cement is controlled for fineness (Blaine) and composition, and the usual physical and chemical tests are made. Screw-type samplers are used on hoppers over pumps. Variable-speed motors and drives make it possible to conform to all federal, state, and other requirements.

The latest addition to the laboratory is the Phillips-Norelco vacuum-type X-ray spectrograph. This has three analyzing crystals, a scintillating counter, and a flow-proportioning counter. The unit will be used for development and production control. It gives fast information for analytical control on all elements in cement except sodium, doing this in 20-minutes, as compared to several hours by current methods. This makes possible closer control, not only of the raw materials and composition, but also of the clinker and cement composition, for better product uniformity.

This spectrograph can be converted for use in diffraction, giving direct percentage readings on calcium and magnesium carbonates and oxide and various compounds.

Electrical The Public Service Company of Oklahoma provides power at 69,000 v. to two 5,000-kv.-a. transformers. These reduce the voltage to 4,400 v. for distribution to seven load centers throughout the plant. At each load center is located high-voltage switchgear, a 4160/480-v. transformer, low-voltage switchgear, and a motor control center containing all of the 440-v. motor starters for the department involved. Load centers are located at the following departments: limestone crushing, shale crushing and drying, raw mill, raw mix storage and blending, kiln, finish grinding, and packing.

(*Continued on page* 131)

withstands heavy impact and severe abrasion in a variety of uses

Bucket edges and teeth hard surfaced with McKay Hardalloy 44 Electrodes resist abrasion far better and wear longer than the original surfaces. This has been proved time and again, not only for bucket edges and teeth but for ditcher rollers, crusher rolls and similar equipment.

McKay Hardalloy 44 is an all-position Electrode with excellent arc action, low spatter loss and little slag. Due to the low hydrogen coating and closely controlled alloy balance, Hardalloy 44 deposits provide the best combination of impact and abrasion resistance.

Hardalloy 44 bonds well to both carbon steel and 12-14% manganese steel. Deposits are not machinable. They are sound and smooth and require but a minimum of grinding.

WRITE FOR Hardalloy 44 Data Sheet. Contains full details on the operational characteristics, physical properties, and weld metal composition. Specific applications are included.

M-8

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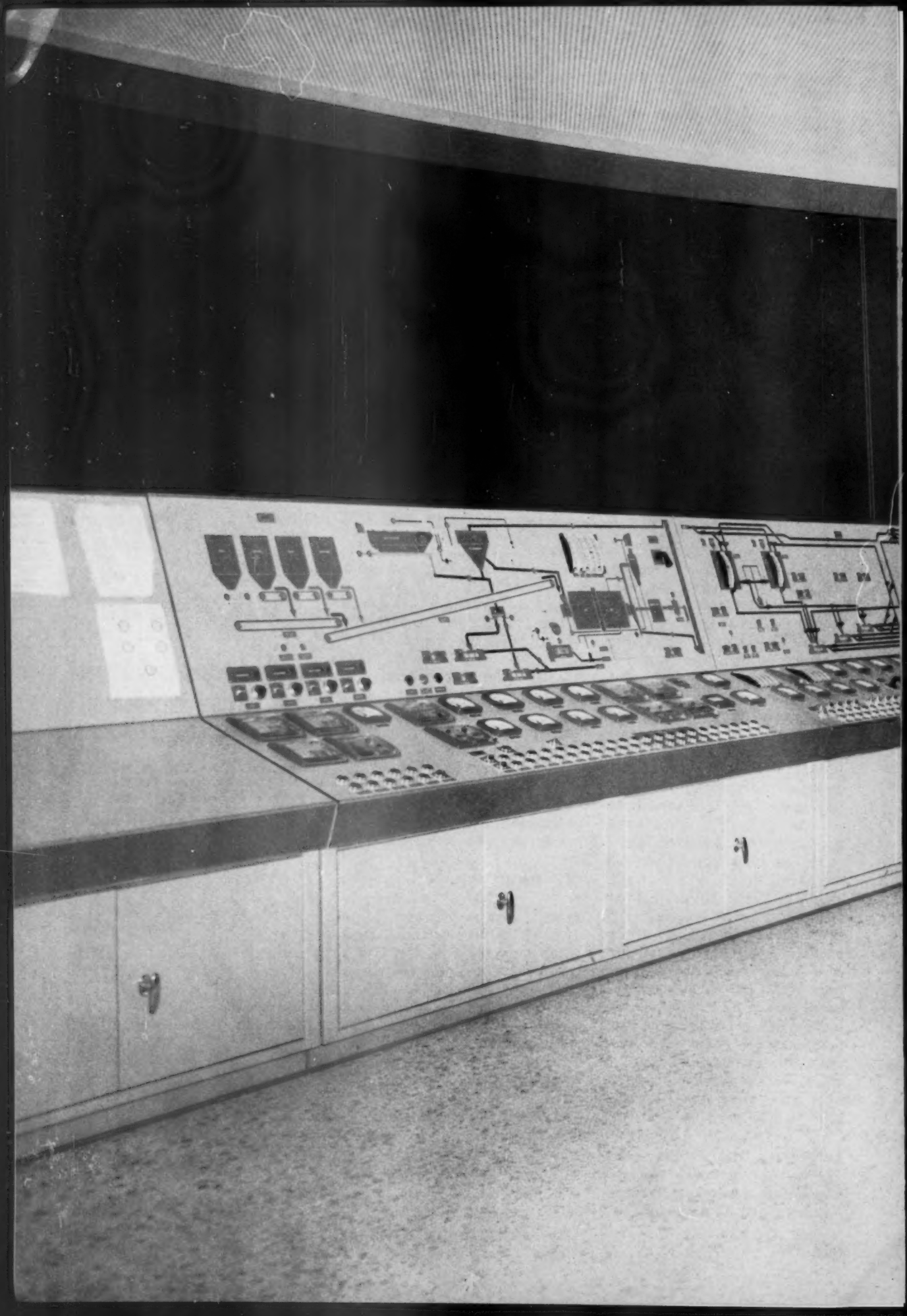
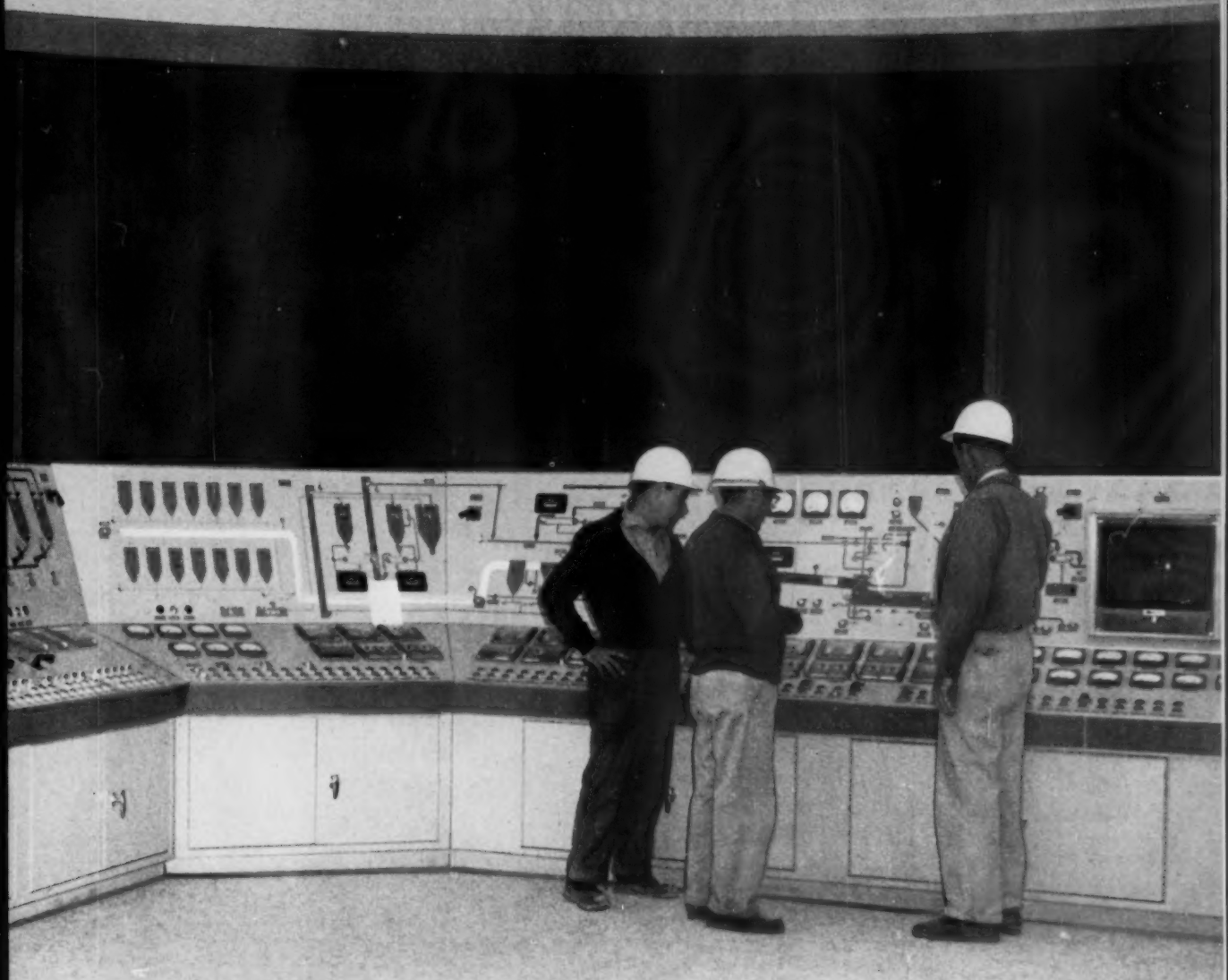


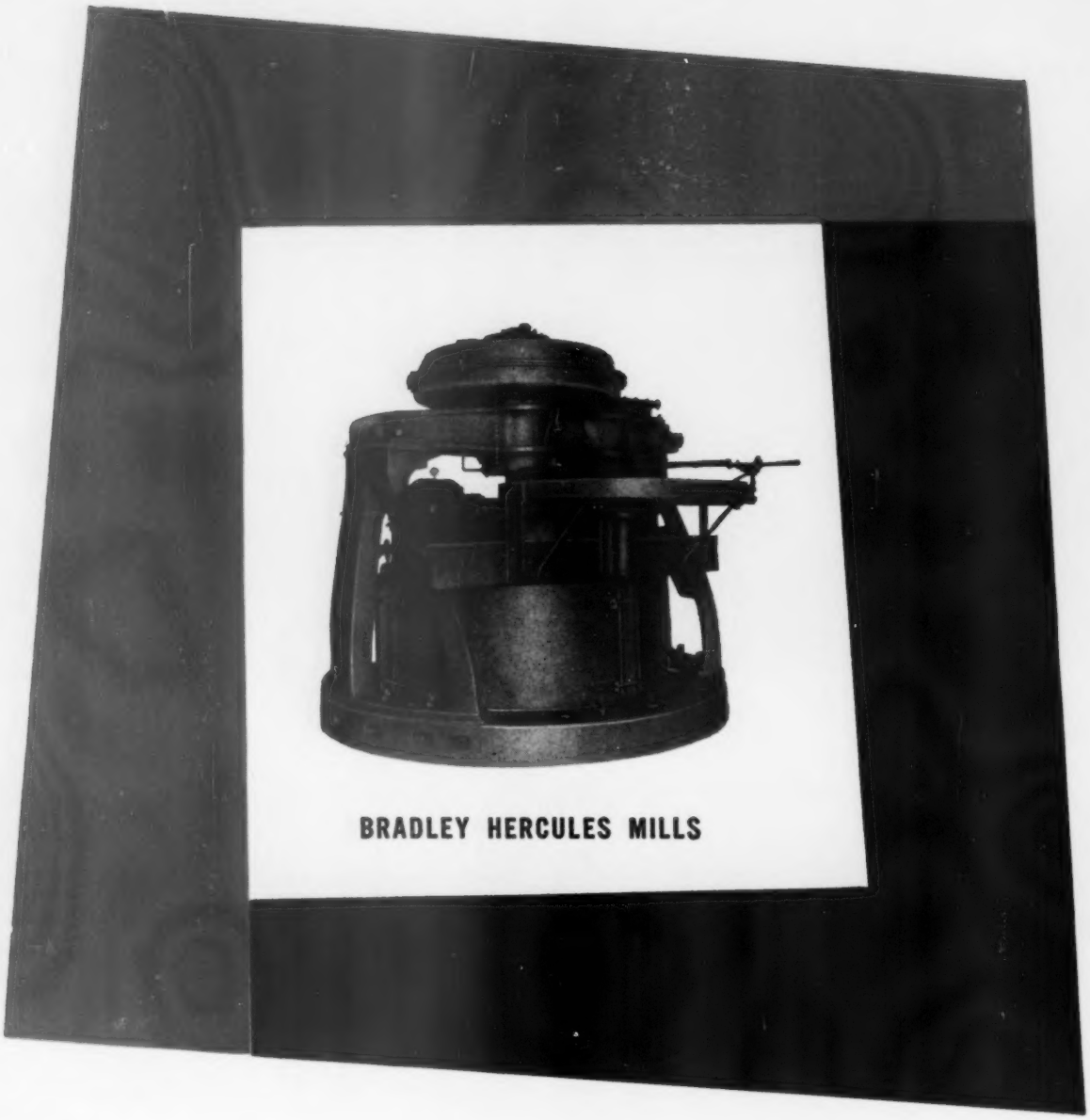
New cement plant controlled by "dancing lights"



This crisp, walnut-paneled room is the nerve center of the world's most modern cement plant, in Tulsa. At the touch of a few electrical switches, the fully-automated plant pulses to life. From that point on, from quarried limestone to finished cement, no human hands have to toil. Even in this control room, engineers need only watch the dancing panel lights to see that every phase of the cement-making process is running itself with unchanging efficiency. The complex electrical systems which totally direct this plant's operation were engineered and constructed by Kelso-Burnett for the Dewey Portland Cement Company, Division of American-Marietta Company.

KELSO-BURNETT ELECTRIC CO.

ELECTRICAL CONTRACTORS • 223 W. JACKSON BOULEVARD • CHICAGO 6, ILLINOIS



BRADLEY HERCULES MILLS

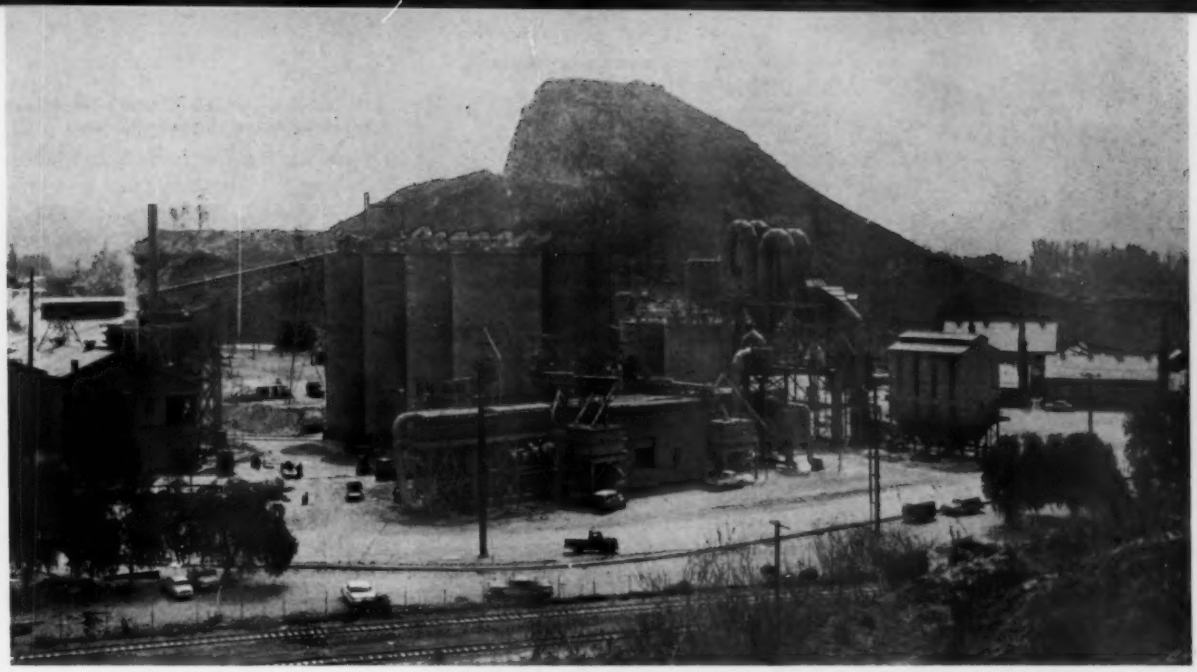
HOW TO INCREASE CEMENT PRODUCTION UP TO 50% . . .

The capacity of an existing tube or compartment mill can be increased up to 50% or even higher simply by installing a Bradley Hercules Mill as a preliminary pulverizer on either the dry raw or finish side. Yet this increased production of cement raw material or finished cement is obtained at no increase in horsepower consumption per ton or barrel produced. The Hercules automatic electrical feed control eliminates manual operation. Rugged construction . . . dustless operation . . . easy accessibility to grinding parts keep maintenance costs at an absolute minimum. That's why so many in the cement industry rely on the Hercules Mill for increased production of finished material.

See Chemical Engineering Catalog or for complete information, write for Catalog No. 63

BRADLEY PULVERIZER CO. LONDON ALLENTOWN, PA. BOSTON

superior grinding equipment since 1891



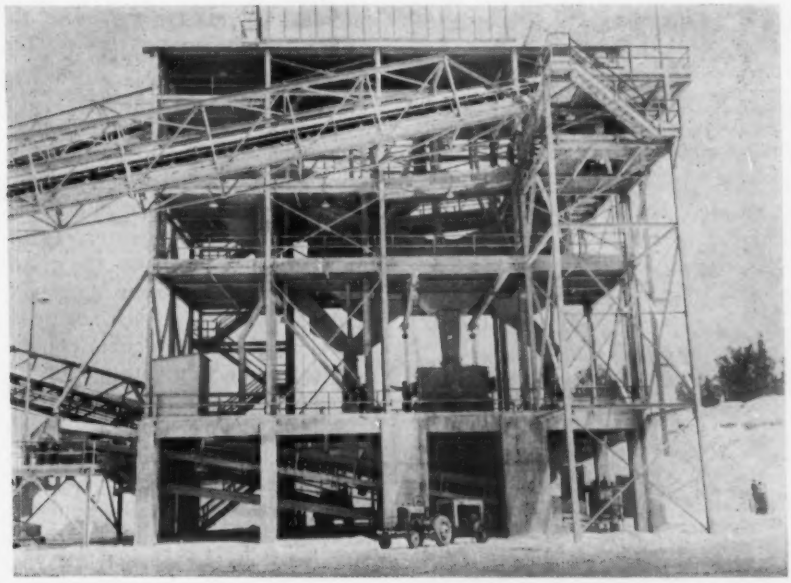
Riverside's new Crestmore white cement plant. Left to right: a portion of the adjacent old regular (gray) cement plant; raw storage silos and grinding department; two homogenizing tanks; cyclone collectors; glass-bag dust filter structure handling kiln-exit gases.

•Riverside's New White Cement Plant

250,000-bbl. dry process operation first in west on exclusive production of white portland

By HARRY F. UTLEY

The new secondary crushing structure (screens above), where limestone is reduced to mill-feed size for both the regular and the white plants.



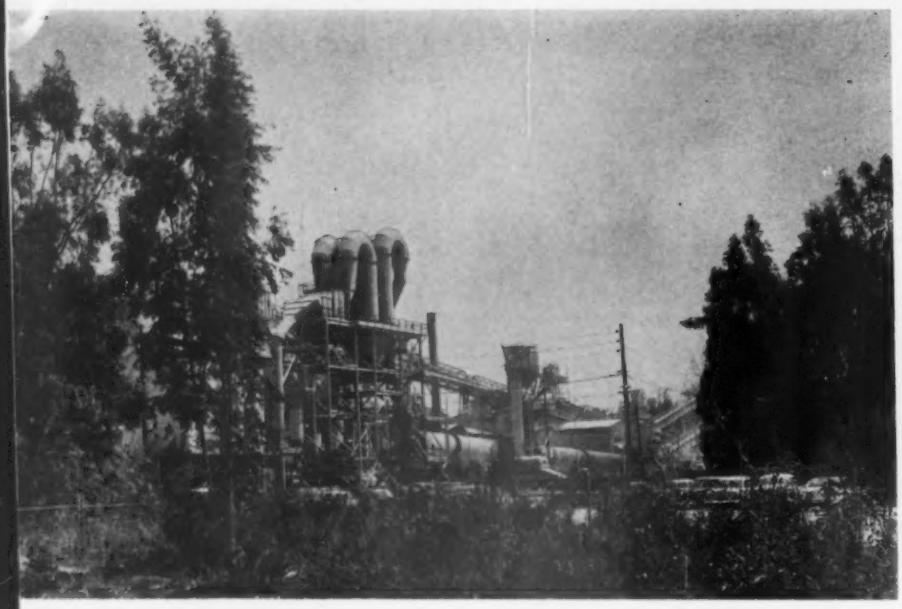
ANOTHER ON THE SPOT report

THE first plant in the West built exclusively for the production of white portland cement—Riverside Cement Company's new facility at Crestmore, near Riverside, Calif.—started production in May of this year. It was erected on a 50-acre site adjoining the company's existing regular portland-cement plant.

Riverside management expects to be making deliveries of the product in volume in July. In recent years, all white cement used in the West has had to be shipped in, primarily from Texas, and some has been imported from Japan and Mexico.

The new plant has a designed initial capacity of about 250,000 bbl. annually, utilizing one rotary kiln and the dry process. Processing in general is practically the same as with Type I ordinary (gray) cement. The whiteness is achieved through the purity of the raw components, which are practically iron-free, and the avoidance of iron contamination in raw and finish grinding.

White cement producers in the



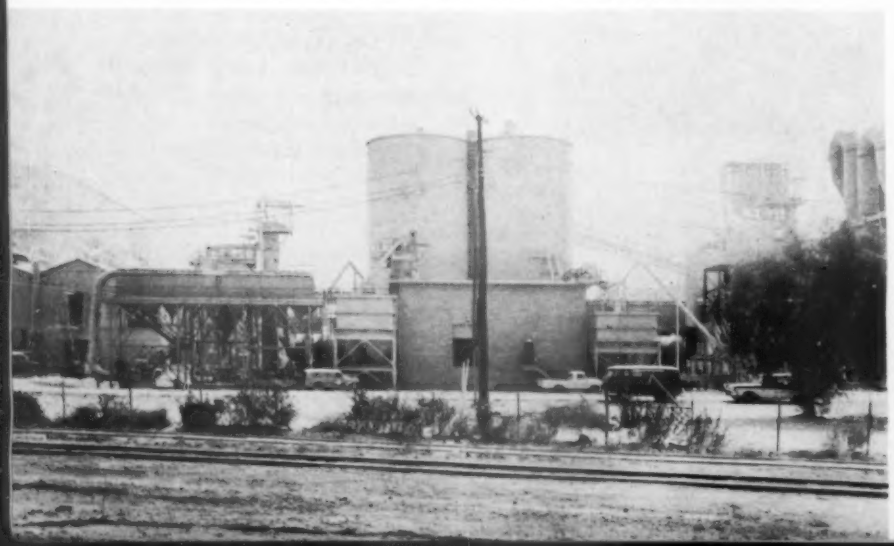
In this view the 253-ft. rotary kiln is seen between clumps of eucalyptus trees.

United States, as well as those in foreign countries, have always been extremely reluctant to reveal much in the way of processing details in the manufacture of the product, and Riverside company management proved to be no exception, insofar as its white cement plant at Crestmore is concerned. Much of the technical know-how was absorbed in Europe by various Riverside operating officials who visited and studied some of the outstanding white cement plant facilities on the Continent in the last two or three years.

At Crestmore, the limestone is obtained from an underground mine worked to a depth of 500 ft. to supply both the regular cement plant and the new white plant. The Crestmore stone is extremely clean and high-grade, occurring without intrusions; and being an underground operation, it is free of overburden contaminants. Its purity for white cement manufacture was, indeed, one of the factors which suggested white cement at the outset.

Stone is brought to the surface by electric-powered trucks. Following primary crushing, secondary reduction to minus ⅜-in. mill-feed size is done in a newly installed 800-hp. Hammermills, Inc., Bulldog center-feed impact mill.

Raw- and finish-grinding mills flank the building in the center foreground, which houses the 800-hp. motors driving the mills. The old gray cement plant buildings are at the left. The new white cement plant structures are partially visible at the right.



The white sand comes from a pit owned and worked by the Riverside Company in Temescal Canyon in the Corona, Calif., silica sand district. The sand pit is about 20 miles from Crestmore, and the sand is transported in company trucks.

The third and minor component in the Crestmore white raw mix is a kaolin-type "bone clay" mined near Bishop, Calif., and purchased to specification by the Riverside Company. Enclosed hopper truck-trailers bring the clay to the new plant. The one-way haul is about 275 miles by highway.

All raw materials are held in closed storage to avoid contamination, the storage structure being a nest of eight reinforced-concrete silos with interstice bins. Total capacity is about 25,000 tons. Elevation of materials to the top of the silos is by two-stage bucket elevators with a total lift of 84 ft.

Raw materials are reclaimed and proportioned in a tunnel beneath the silos and conveyed to the raw-grinding room in the mill building.

Both the raw- and finish-grind tube-mills are F. L. Smidth Tirax units. The raw and finish mill-rooms flank a dust-free motor room, where two 700-hp. synchronous motors are installed to transmit power to the mills through Symetro drives. The raw mill is 12 by 21½ ft. in size; the finish mill is 12 by 19 ft.

In gray cement manufacture, steel balls are normally used in grinding mills as the grinding media, which impinge on steel mill liners. Since white cement must be essentially iron-free, however, the grinding media used are ceramic pebbles, and the liners are also ceramic. Grinding is a closed-circuit operation in conjunction with air-separation and dust-recovery units.

After being ground to proper fineness, the raw-mill product is pneumatically conveyed to a pair of blending-homogenizing silos preparatory to being fed into the rotary kiln.

The 9- by 253-ft. F. L. Smidth kiln is fired with natural gas through a dual-type burner, which can also handle oil in an emergency. The kiln is quite conventionally lined, utilizing 70 percent alumina brick in the hot zone. It turns at about 1 r.p.m. and is driven through reduction gears by a 60-hp. motor. Exit gases are cooled and partially cleaned in Multiclone collectors before passing to a Western Precipitation ThermoFlex glass-bag filter house for final extraction of dust.

The kiln is equipped with a Unax cooler. The discharged clinker, nearly white in appearance (in contrast to dark gray or nearly black in the case of regular portland cement), is then taken by Jeffrey vibratory conveyors to the mill room for finish grinding. The finished white cement is then transferred from the air separators to the finish silos by the Fuller-Kinyon system.

The eight finished storage silos, together with their three star bins, have a total capacity of about 43,000 bbl. They were erected quite some distance from the new white plant proper, convenient to the storage and packhouse facilities serving the existing gray plant. Most of the product will be bagged.

Chief markets for the product include its use in terrazo, swimming pools, and prepared stucco. The firm, through its recently-appointed marketing manager for white cement, Robert E. Hyche, expects to develop broader uses through the architectural profession in the West. Since all of the white commodity heretofore has had to be shipped great distances at considerable expense, Riverside starts its marketing program with a definite advantage, pricewise. The product, of course, is premium priced, selling for about two and one-half times that of regular cement, currently around $10 per bbl., against about $4 for Type I gray on the West Coast.

Superintending the new white plant is Wm. N. Kopenhefer, who formerly worked in quality control and production areas at the company's two gray cement plants.

Assisting the Riverside organization in creating the Crestmore white plant were the Fluor Corporation, Los Angeles, design and engineering; and Diversified Builders, Inc.,

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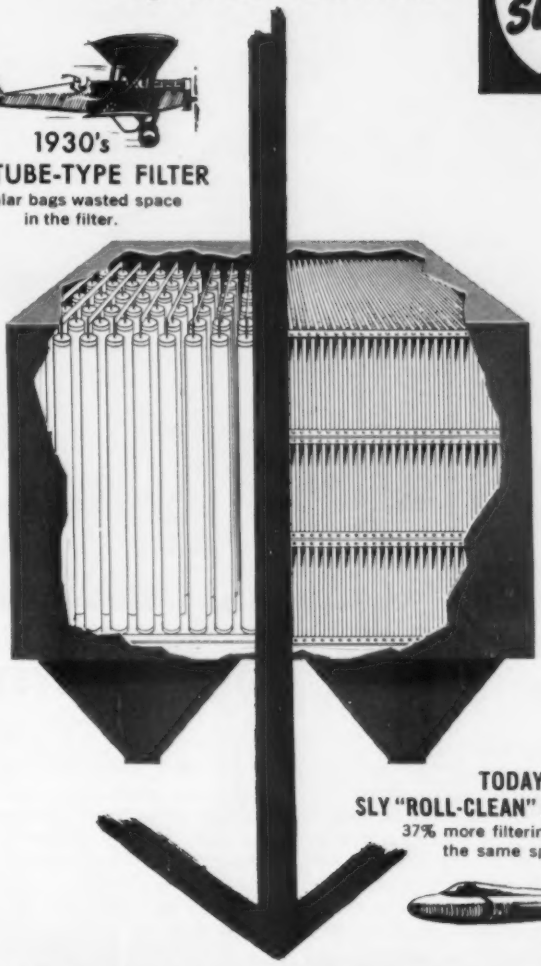

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"Roll-Clean" Dynaclone: Patents 2,867,289, 2,938,598. "Resist-O-Wear" Filter Bags: Patent 2,959,247.

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BLENDING BULK MATERIALS...

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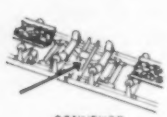
All major W & C system components are unitized, pre-engineered, equipment packages. Thus, systems can be readily and economically job-matched to save trial-and-error time and costs. For *consistently* accurate and efficient control of continuous bulk material formulations, turn to W & C.

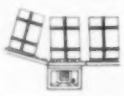
WRITE FOR BULLETINS / Bulletin 60 fully describes W & C Conveyor Scale Systems
Bulletin 14 describes other W & C Automatic Weighing Systems

See page 644 Chemical Engineering Catalog for list of representatives. WC101R



CONVEYOR SCALE SYSTEM

CONSTANT-FEED WEIGH-HOPPER SYSTEMS



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construction and erection.

While this is the first plant built in the West exclusively for white production, it is not the first time white cement has been produced in California. Calaveras Cement Company turned out a white product for several years in its plant at San Andreas. A part of the regular facilities of the Calaveras plant were intermittently utilized for this purpose, involving painstaking and costly efforts in kiln cleanout, re-lining, temporarily converting the grinding mills with ceramic liners, pebbles, etc. Production of the white product was discontinued by Calaveras in 1954.

Sulphur Added to Minerals On Exploration Aid List

According to an announcement released by the Office of Minerals Exploration, sulphur will be added to the list of minerals for which exploration assistance is given.

Minerals for which the government will pay 75 percent of the exploration cost are the following: asbestos, bauxite, graphite (crucible flake), kyanite (strategic), mica (strategic), quartz (piezoelectric), and talc (block steatite).

Minerals eligible for 50 percent cost contributions are fluorspar, rutile, and sulphur.

Rail rates on cement shipped into the Upper Midwest were reduced an average of 15 percent on June 6, acording to an announcement made by five railroads. The new rates will apply to about 20 producers using the Soo Line, the Great Northern, the Northern Pacific, the Milwaukee Road, and the Chicago and North Western.

Spokesmen for a newly established concern, the Southwest Vermiculite Company, at Lubbock, Tex., have announced that a plant will be erected in this city. Products will be vermiculite for concrete aggregate and insulation material.

Dewey's Tulsa Plant

(*Continued from page* 123)

All motors over 200 hp. are operated on 4160 v. and the smaller ones on 440 v. Full voltage starting is used throughout, including the three 1,500-hp. synchronous mill motors. Local push-button stations are supplied for all motors—for test and start up operations where there is need for local control.

The indoor lighting system is a combination of 440-v. mercury vapor and 277-v. fluorescent lamps. Mercury vapor lamps controlled by photo-electric cells are used out-of-doors.

Dust Collection Dust suppression was a basic factor in the design of this plant. There is a total of 29 Northern Blower Co. cloth bag dust filters, located at various dust pick-up points, from the limestone and shale crushing departments through to the packhouse. Western Precipitation Multiclones are used for venting the clinker cooler and shale drier. A Western Precipitation combination cyclone-baghouse installation serves the kiln. Its efficiency is evident from the fact that no dust is visible during normal operations.

Safety All possible precautions are taken for the safety of the employees. A safety director is employed, regular safety meetings are held, and the company competes in the P.C.A. safety contest. Safety shoes, hard hats, and safety glasses are mandatory equipment for all employees. All moving machinery has protective guards. Even where equipment is remote controlled, local push-button switches are provided. On belt and pan conveyors, cables extending their full length can stop the equipment from any point. Lock-out systems for equipment are applied everywhere.

Every precaution is also taken to protect equipment. There are automatic Minneapolis-Honeywell flame detectors to cut off gas feed to the drier and raw mill heater if the flame goes out. About 60 Swanson zero-speed switches are used on all belt conveyor tail pulleys, screw conveyor tail shafts, and bucket ele-

(*Continued on page* 135)

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The large diameter, short-length trunnions used on Hardinge Conical Scrubbers permit chute feeding of unsized ore and rock at rates up to 800 tons per hour. The superincumbent mass action of the charge quickly slurries the clay and dirt, permitting ready separation on washing screens or trommels.

Hardinge Scrubbers are in wide use in cleaning such diversified materials as limestone, phosphates, iron ore, river gravel, ganister rock, dolomite, abrasives, and in separating clay from rock and gravel.

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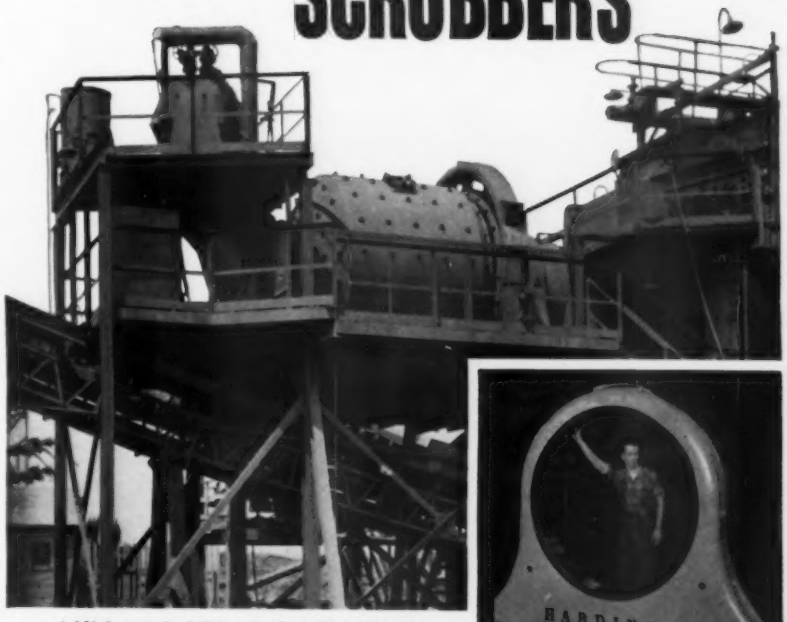

A 10′ diameter by 84″ long Hardinge Conical Scrubber scrubbing 5″ iron ore.

A Hardinge Scrubber bearing—inside diameter 60″.

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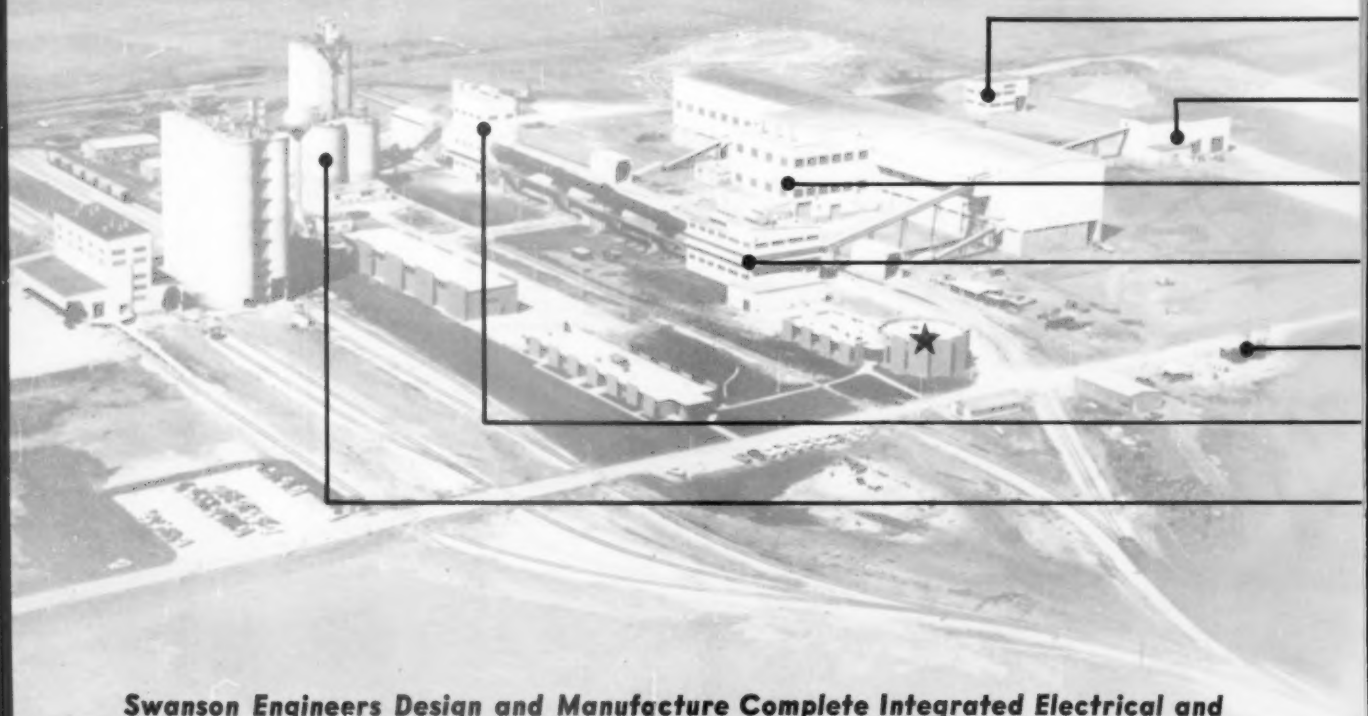

Swanson Engineers Design and Manufacture Complete Integrated Electrical and Process Control System for Entire Dewey Plant at Tulsa, Oklahoma. Analog Computor Control and Continuous Monitoring of All Equipment by Swanson's Graphalarm System Make This one of World's Most Modern Installations.

All phases of electrical and instrument control from concept to start-up and proven operation handled by responsible Swanson Project Engineers. This includes preparation of initial process flow diagram, electrical control and inter-lock sequences, control equipment specifications, instrument loop diagrams, design and manufacture of control centers, final field checkout and assistance in plant start-up. Swanson engineering services are available to construction and design contractors, as well as the ultimate user.

The Swanson Graphalarm System incorporates multi-color lights located in the graphic flow diagram on the operating console. This monitoring system eliminates the need for the operator to continuously scan the control equipment. In the event of an "off-normal" condition or equipment failure, he is immediately alerted by an audible signal and flashing status light, "pin-pointing" the trouble in the plant.

Swanson-designed control devices for the cement industry include: Kiln Thermocouple Slip-rings for material temperature measurement, Shell Scanners, and Low RPM Speed Switches. For complete information direct your inquiry to the Swanson Engineering & Manufacturing Company, Cement Division.

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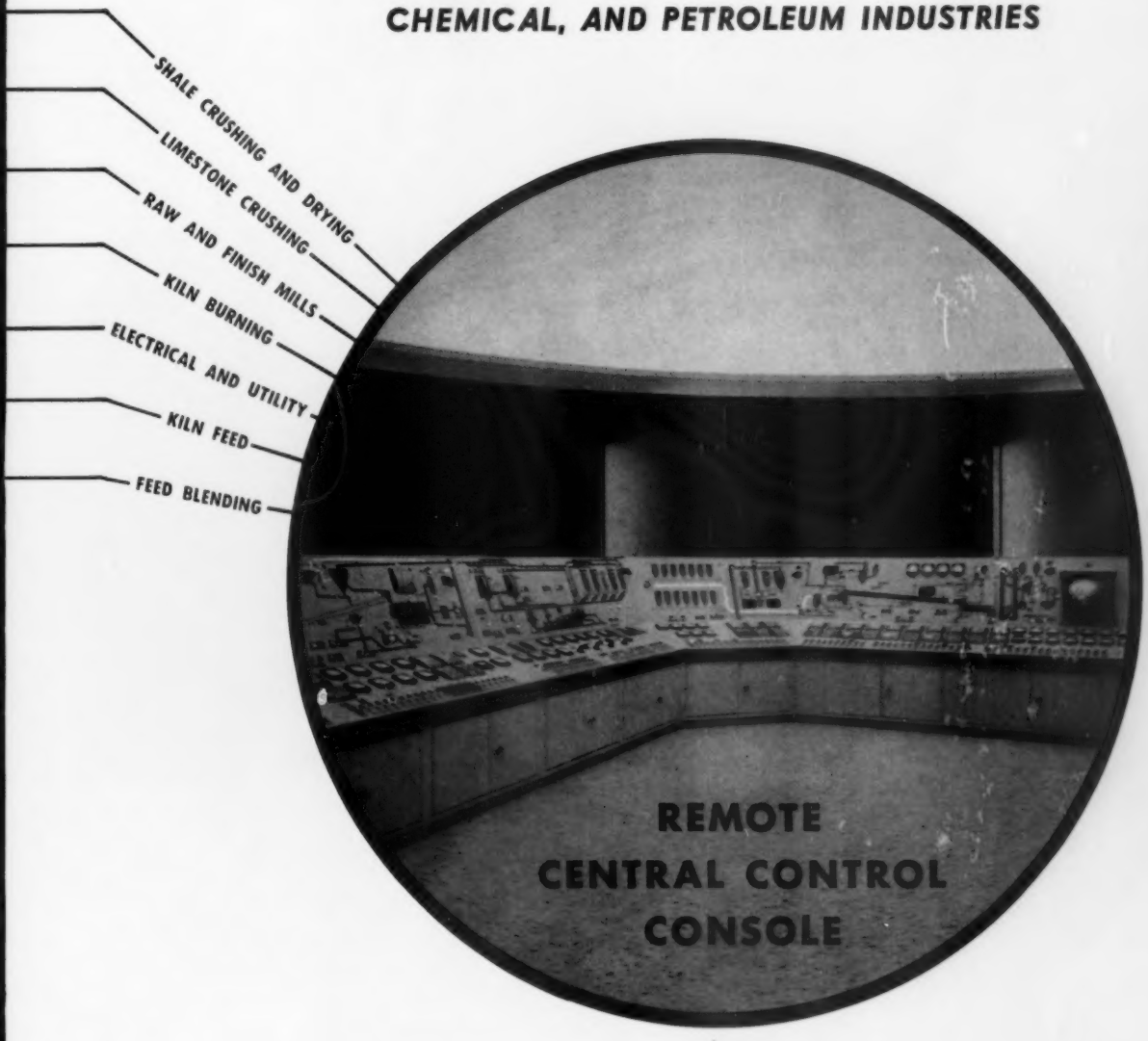
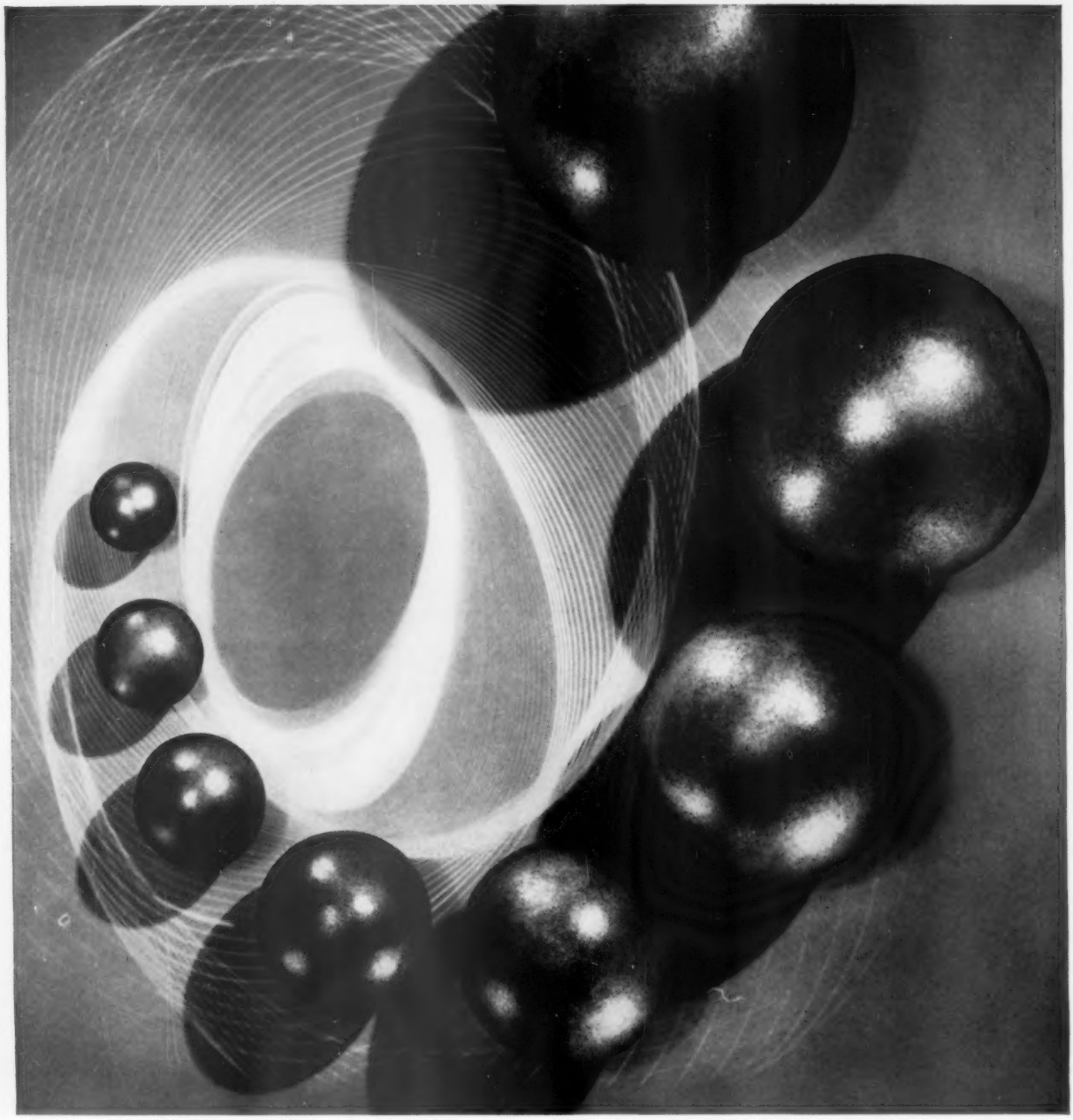


★

DEWEY PORTLAND CEMENT COMPANY

DIVISION OF

AMERICAN - MARIETTA COMPANY



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The Colorado Fuel and Iron Corporation
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Dewey's Tulsa Plant

(*Continued from page 131*)

vators which have external takeups, These switches insure against material spillage or pileup in case of power or equipment failure. They have already paid for themselves by preventing damage to belt conveyors, etc. Automatic sequence stopping of all equipment in any flow is also provided. R.C.A. metal detectors in each raw-material handling department protect crushers.

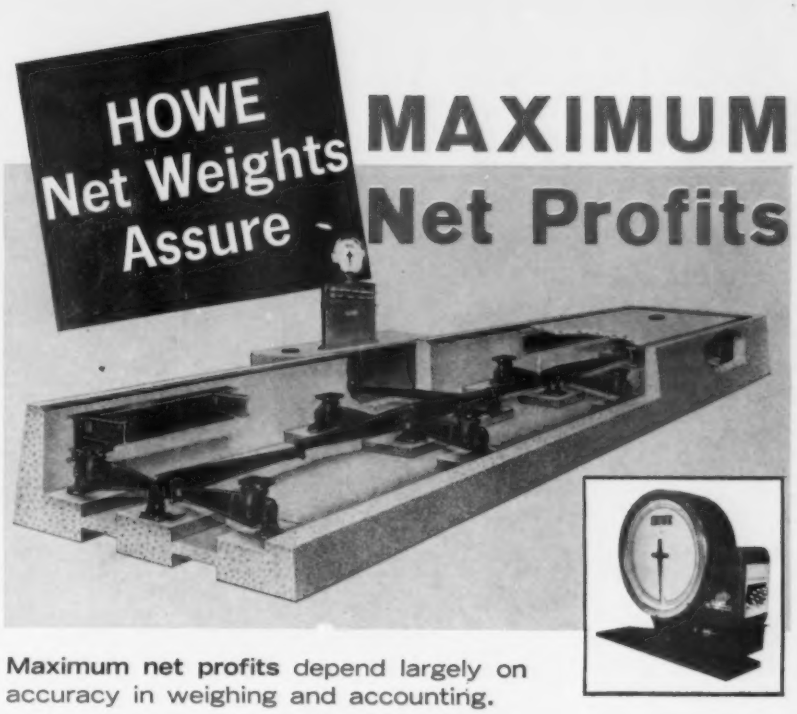
Other As has been stated, the Crosby Construction Co. designed the plant, in co-operation with company engineers. Crosby was also the general contractor, building all plant structures and erecting the major machintry units. The laboratory-console building, general office, and shops were designed by Stewart-Robison-Laffon, architects, Davenport, Iowa. The Manholtor Construction Co., erected these buildings. The Kelso-Burnett Electric Co. did the electrical engineering and contracting for the entire plant. The instrumentation concept was developed by the Swanson Engineering & Mfg. Co., in conjunction with Dewey personnel. Swanson designed and built the console panels and supplied all necessary field sensing equipment, thermocouples, etc. Foxboro solid-state instruments are used. Farval automatic lubrication is used on the kiln, cooler, and mill drives. Marathon Electric Mfg. Co. supplied most of the smaller motors.

All belt conveyors were supplied by the Stephens-Adamson Mfg. Co.; the main elevators and drag-chain conveyors by the Link-Belt Co.; the smaller elevators, screw conveyors, and clinker pan conveyors by the Webster Mfg. Co.

All plant buildings are of concrete-and-steel construction, with corrugated Transite siding and roofing and occasional Corolux green translucent panels for light. American-Marietta paints are used throughout, and Master Builders (American-Marietta) Masterplate is used at points of heavy wear in the concrete floors.

Staff The plant staff is headed by Arthur P. Hunter, plant man-

(*Concluded on page 147*)



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By BUREN C. HEROD

♦ Miron Company Limited

Industry newcomer shows "muscle" with world's largest dry-process cement kiln and unique material-handling layout, processing installations

Opposite page, top:
THE NEW 4,000,000-BBL. DRY-PROCESS CEMENT PLANT sits almost in the middle of the varied Miron operations, which it supplies in addition to open market customers in the Montreal area. In the background, beyond the cement mill proper, is the bulk truck-loading installation. Other facilities in this view include central ready-mix operations, a concrete block plant, an aggregate plant, and a bituminous mixing operation. One of the central-mix installations on this property is reported to be the largest in the world.

ANOTHER ON THE SPOT report

FROM practically any standpoint, the new 4,000,000-bbl. dry process cement plant placed in operation by Miron Company Limited last year near Montreal, Quebec, is one of the most interesting cement producing facilities on this continent. Its commanding position of importance in the over-all highly diversified activities of the Miron organization, plus its unusual and efficient layout, are two of the most significant factors in the development of this cement operation.

The new cement mill is the latest and largest item in M.C.L.'s growth picture, which displays other projects that have been striking in their own right. The tremendous surge in commercial, industrial, and residential construction on the island of Montreal in the last 15 years has called for an all-out effort by materials producers. With this impetus, M.C.L. added ready-mixed concrete production to its existing quarrying operations; it has attained a capacity of 10,000 units annually in a concrete masonry plant; and has

Opposite page, bottom:
THE UNUSUAL LAYOUT of the plant is readily apparent in this view. From the left, at ground level, only the top few feet of some of the storage silos are visible. In the left foreground are the shipping silos. About two-thirds of the long roofed structure is comprised of a rectangle formed by 28 silos for raw materials, mill feed storage, and cement storage. Clinker is stored in the rectangle. The nearer end of the building houses the three mills. On the other side of the structure is the kiln building.

Right:
THIS PERSPECTIVE of the 15- by 550-ft. kiln, looking toward the feed end, testifies to its impressive size—it is reported to be the largest dry-process kiln in the world. The mills in this operation also rank among the largest of their type.

ANOTHER VIEW OF THE KILN, at the feed end. Its riding gear is installed on seven supporting piers. Of the latter, the one closest to the feed end is also formed as a dust bin. It houses a pump with which lime dust may be transferred to storage in the mill building.

built a facility for the production of manufactured sand. One of the four Miron central-mix concrete installations is reported to be the largest in the world; and these operations, along with the concrete masonry plant, make M.C.L. one of its own best customers for the output of the new cement mill.*

All of these diversified activities (plus a bituminous mixing plant, pipe plant, and other facilities allied to construction needs) are located on a single tract of more than 450 acres in the City of Saint Michel in the north central part of the Island of Montreal. The firm's construction division is actively engaged in projects throughout the 240-sq. mile area of the island, and is the largest single customer for the ready-mix division. Thus, the new cement mill completes a direct line of service from quarry to construction site in which M.C.L. extracts, processes, supplies, and/or places the materials vital to the building boom of Montreal and its environs.

This extensive composite of production facilities was purchased from Miron & Freres Ltd. last year by Belgian interests and given its present name. The parent company is Cimenteries et Briqueteries Reunies, of Brussels, a major cement producer of western Europe with two mills in Belgium.

Major Features One of the most interesting aspects of the new M.C.L. cement plant is found in approaching it on ground level. From that perspective, the only visible item of apparent connection with a cement installation is the kiln stack. This is due to the fact that all facilities except a crushing phase and the bulk loading station are built on the quarry floor adjacent to one quarry wall. (See accompanying illustration.) Only the top few feet of some of the storage silos are visible at the higher elevation.

For its size, the over-all plant is very compact. It also incorporates an unusual layout. As seen on the accompanying plan drawing, 28 silos were constructed in a rectangle enclosing a large 80 by 400-ft. clinker storage area. At one end of that rectangle (a part of the complete roofed structure) is the mill room, with related feed bins and equipment. Adjoining one side of the silo rectangle (on the quarry side) is the kiln building. The layout permits future expansion of either the mill or kiln departments without disruption of existing processing.

At the opposite end of the silo building from the mill department, and on the upper elevation, is the raw material crushing and screening installation. Also at that level, and a short distance from the plant, are the bulk-loading facilities plus the office-laboratory building.

The 15- by 550-ft. kiln at the heart of the operation is described as the largest dry-process kiln in the world. Similarly, the three 12- by 34-ft. mills rank among the largest of their type in the industry. Both the kiln and the mills were supplied by Canadian Allis-Chalmers.

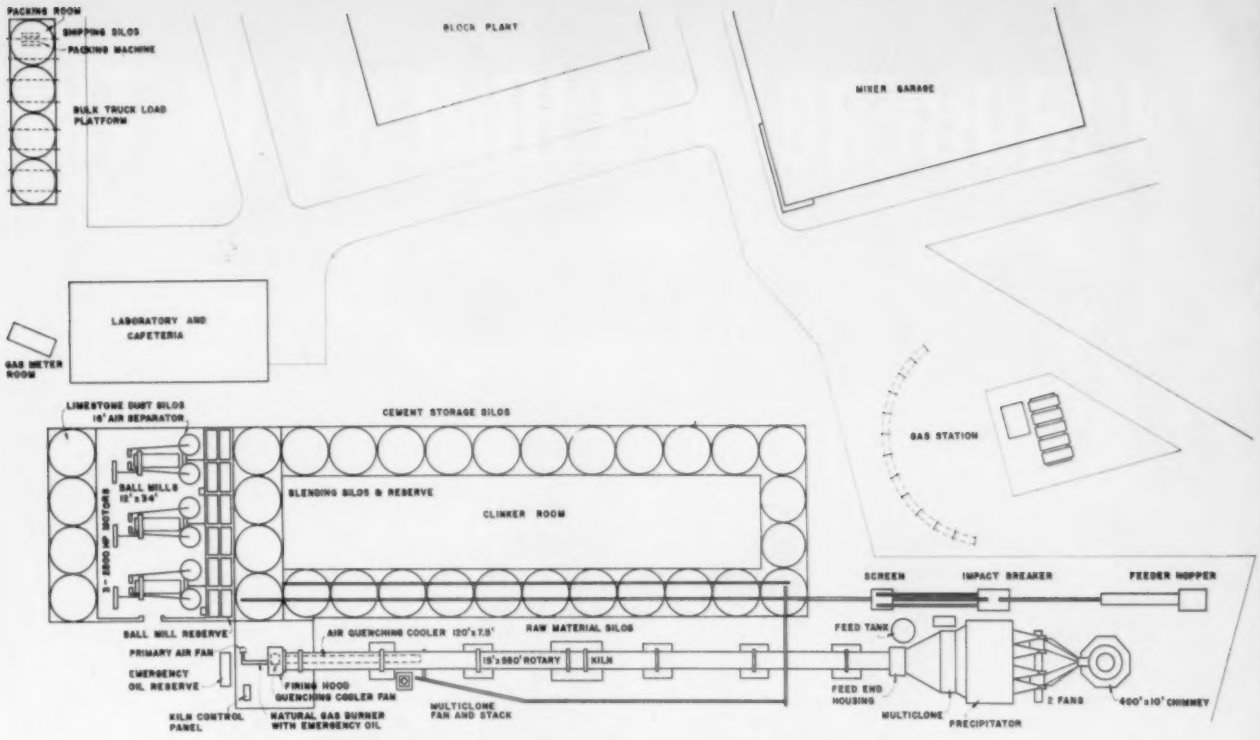
Operating design of the mill department provides that No. 1 and No. 2 mills may be used as "swing" units. Normally, however, only the middle mill is so used as necessary. The very last stage of the operation, packing and loading of finished product, also involves an unusual factor —all shipments of bulk and bagged cement are made by truck. To facilitate this handling, the dock of the shipping silos was designed to provide seven points for bulk truck-loading, and two stations for loading of bagged material.

The entire operation from incoming material handling to product distribution was designed for control from two points, One takes care of all material handling, both raw and finish, and the milling department. The other provides instrumentation and control of the kiln department exclusively.

Raw Material Handling Limestone, shale, sand, gypsum, and iron oxide comprise the raw constituents used in this operation, the limestone being supplied from the aggregate crushing plant on the same property. As received, the respective materials are dumped into a truck hopper, and in subsequent handling all except limestone, shale, and gypsum by-pass a following crushing stage.

Limestone (2-in. top size), shale,

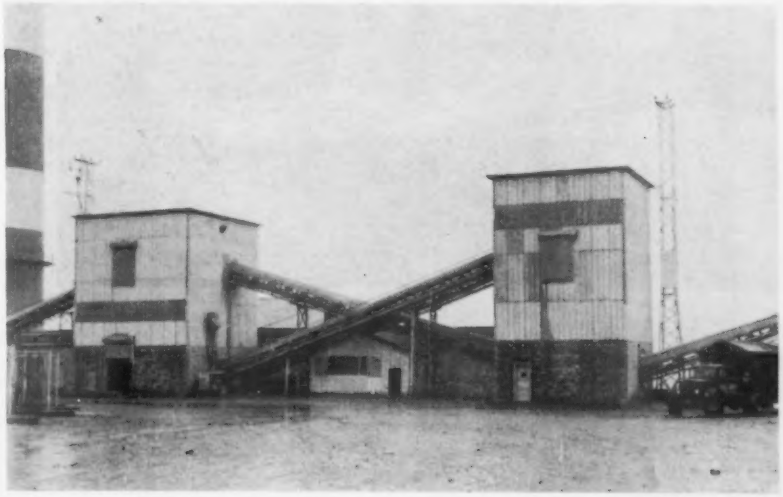
*Montreal's Remarkable Producer Combination, PIT AND QUARRY, May, 1962, p. 158; also The World's Largest Central Mix Plant, MODERN CONCRETE, April, 1961, p. 44.



● **PLOT PLAN of the Miron Company, Limited, cement plant.**

and gypsum entering the flow are transferred by 36-in. belt conveyors from the feed hopper to a 600-hp. Williams 475 reversible impactor. Discharge from the latter, approximately ⅜ in., is carried on 24-in. parallel belts to a pair of 5- by 14-ft. double-deck Lippman screens. Fractions retained on these screen decks are returned to the impactor in closing the circuit, while the minus ⅜-in. material is conveyed on a 36-in. belt into the storage silo building.

Other mix components which have by-passed the impactor are also carried by the latter conveyor for transfer to a 36-in. tripper conveyor, 494 ft. o.c., from which the raw materials are discharged into their respective silos. Eleven of the 28 silos forming the sides of the rectangular storage structure are used for these raw materials. All of these silos are 40 ft. in diameter, 100 ft. high, and accommodate 5,000 tons of material, except one used for iron oxide, which is slightly smaller and holds 4,500 tons. Four of the raw material silos are used for limestone; two each are provided for shale, sand, and gypsum; and one for the iron oxide. The materials-handling system is fully interlocked to preclude delivery of the wrong material to a given silo.

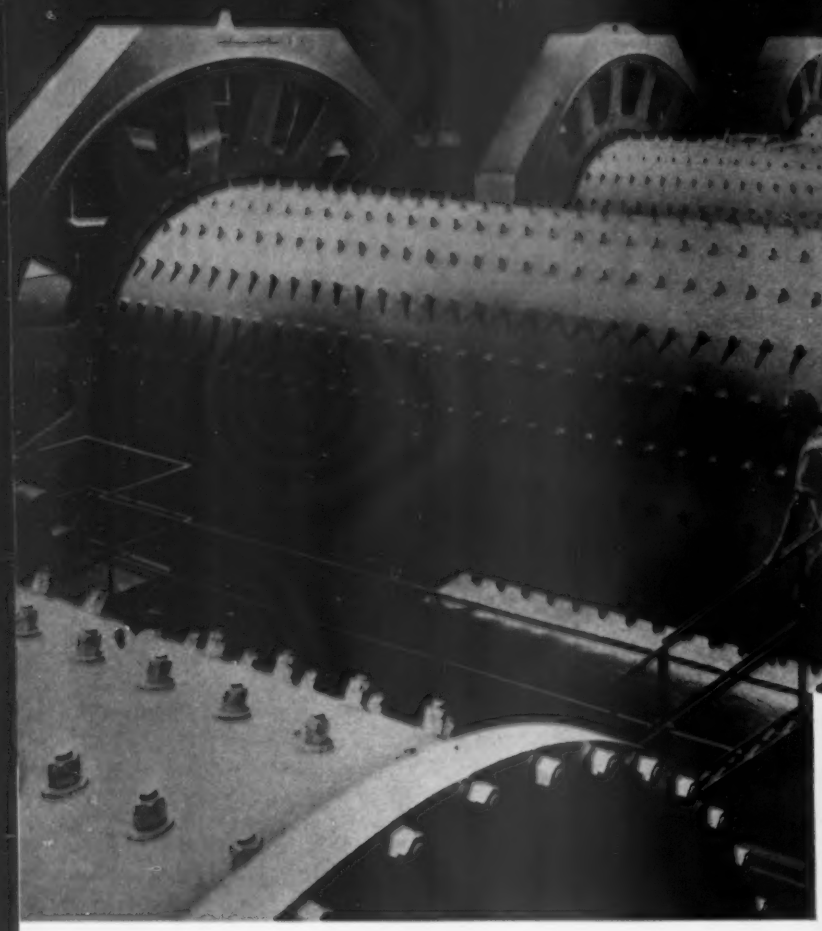


THE RAW MATERIAL crushing-and-screening installation is the only department except the shipping silos which were built on the top level of the site. At the left is the impactor building, in which stone, shale, and gypsum are crushed; and at the right is the structure housing two screens.

Recovery from the drawpoints below the raw material silos is handled through rail-mounted hoppers and feeder belts. These discharge to either of a pair of 24-in. parallel conveyors on 458-ft. centers. The latter in turn feed a reversible 36-in. conveyor, about 93 ft. on centers, that supplies a Chain Belt bucket elevator at each end.

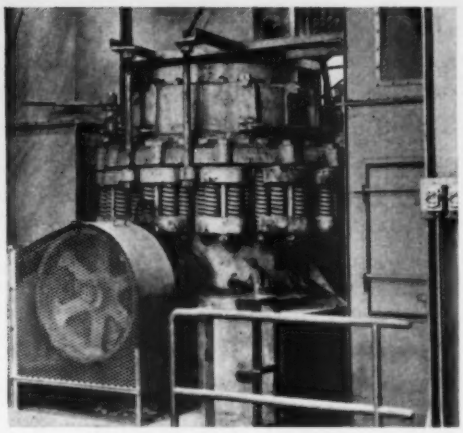
Discharge from the elevators is received on a 36-in. tripper conveyor mounted above one line of six mill feed bins. The material

NORDBERG MACHINERY IN THE

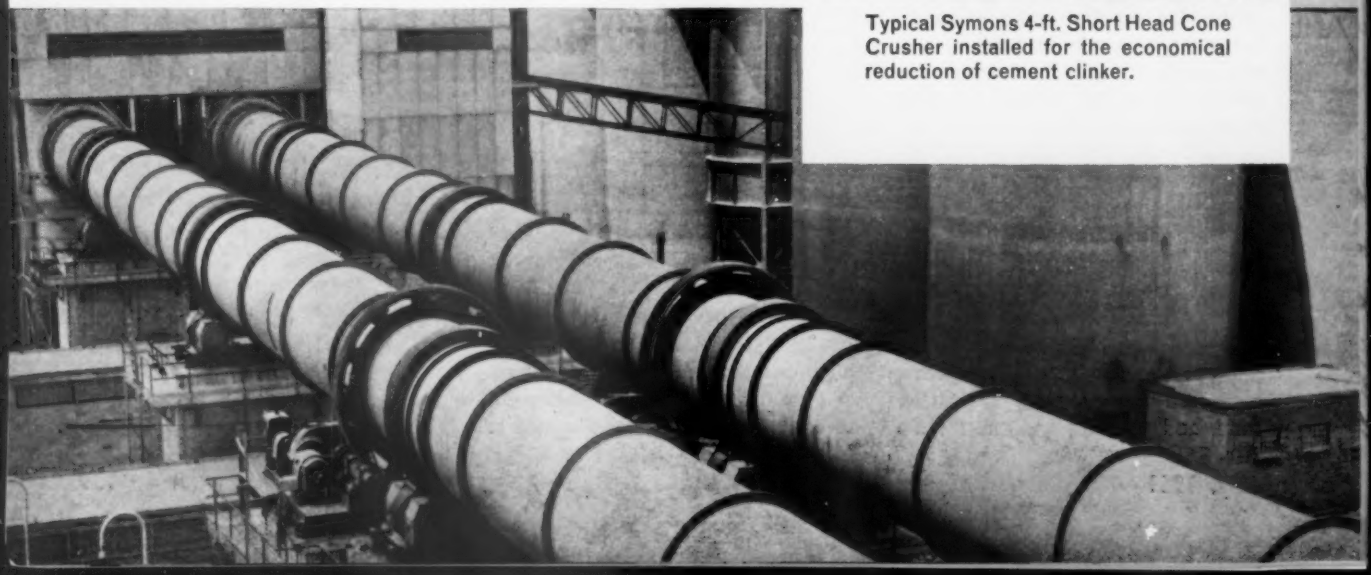


Five 12′ dia. by 36′ Nordberg Two-Compartment Ball Mills, recently installed in a new wet process cement plant. Driven by 2500 hp motors, these are among the largest grinding mills ever built for cement mill service.

Two 11′ dia. by 360′ Nordberg Rotary Kilns installed in a large midwestern portland cement plant.



Typical Symons 4-ft. Short Head Cone Crusher installed for the economical reduction of cement clinker.



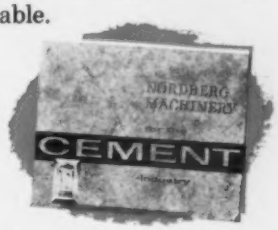
CEMENT INDUSTRY

For over 30 years, Nordberg machinery has been specified by leading producers in the cement industry because of its ability to assure maximum, continuous production at low operating and maintenance cost.

The extensive line of dependable Nordberg cement mill machinery includes Symons® Primary Gyratory Crushers for primary breaking of raw materials; Symons Standard and Short Head Cone Crushers for the preparation of fine, uniformly sized raw mill feed; Symons Vibrating Grizzlies and Screens for scalping and sizing; Nordberg Grinding Mills for wet and dry grinding in ball, tube and compartment types; and Rotary Kilns and Dryers.

For dependable, low cost power, a complete line of Nordberg engines, in sizes to more than 12,000 hp are available to meet practically any cement industry power requirement.

If you are looking for ways to increase operating efficiency and lower production costs, it will pay you to investigate the advantages of Nordberg machinery and the technical engineering services available.



NORDBERG MACHINERY

SEND FOR CEMENT BROCHURE

This brochure illustrates the full line of quality Nordberg machinery designed and built for more efficient cement plant operation. Write for your copy today.

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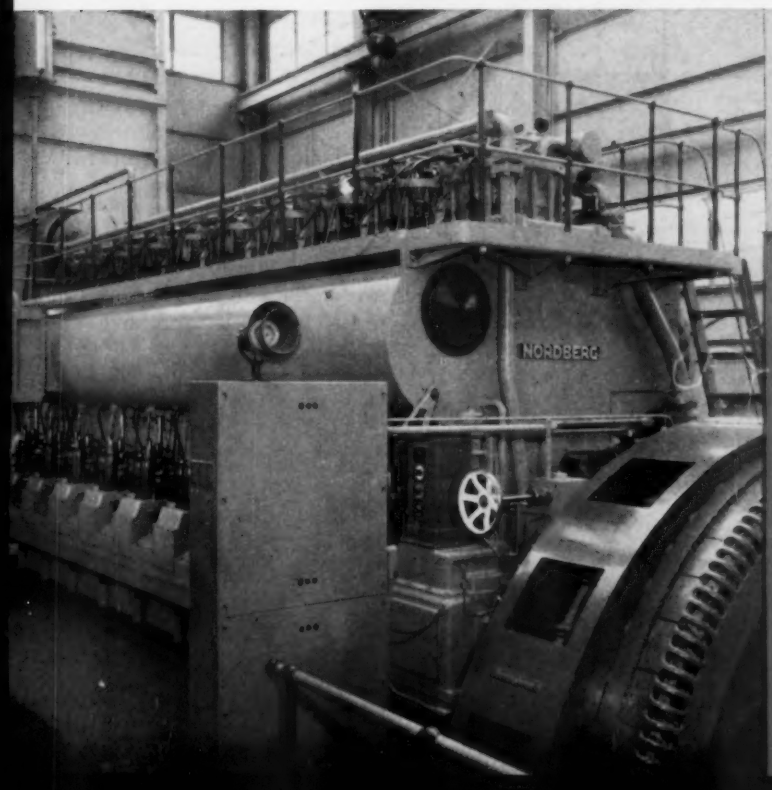
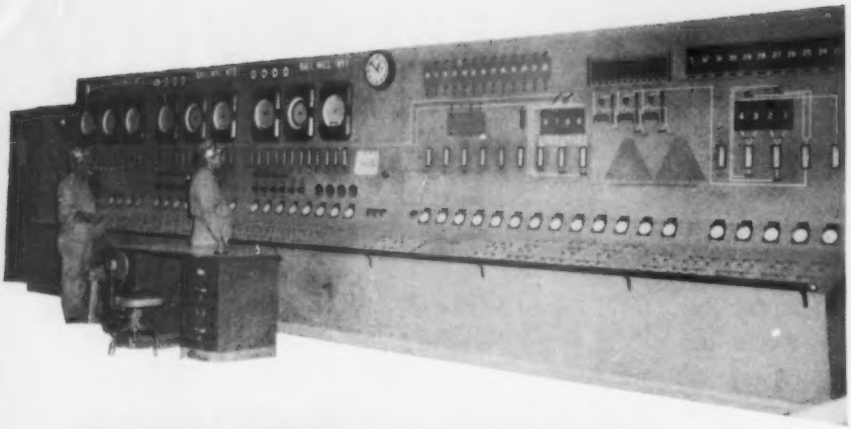
SYMONS . . . ***a registered Nordberg trademark known throughout the world.***



This Nordberg Duafuel® Engine, rated 4425 bhp, 3150 kw, furnishes dependable power for a prominent cement plant in Texas.

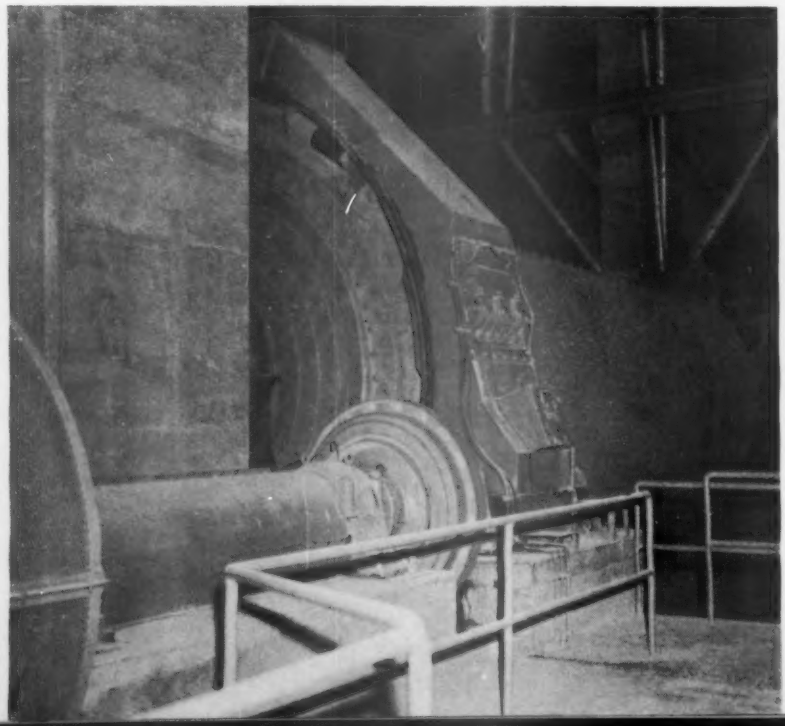
Symons Rod Deck Screens like this 5-ft. by 8-ft. unit give many cement plants low per ton screening costs.



Above:
MILLING OPERATIONS are controlled from this master panel in the mill room. However, this center has the even more comprehensive function of regulating all material handling—both raw and finish—throughout the entire operation.

Left:
ONE OF THE RAIL-MOUNTED HOPPERS AND FEEDER BELTS at a draw-point under one of the raw material storage silos. Clinker is similarly drawn for its flow to the mills.

ALL THREE MILLS are identical 12- by 34-ft. units driven by 2,500-hp. motors. Each is closed-circuited with a pair of 16-ft. separators. Two of the mills may be used in either raw- or finish-grind operations; the third grinds clinker only.



flows into the appropriate bins through tripper chutes, which spread apart a slotted heavy rubber cover on the feed openings of the bins. A parallel tripper, supplied from the former by a short lateral belt, discharges similarly into the second line of six mill feed bins which abut the first group. Individual bin capacity is 500 tons.

The flexibility of this raw material recovery and handling system is such that raw mix constituents may be placed in two sets of mill bins while finish mill feed is placed in the third set, or all three sets of bins may be supplied with material for finish milling. (Clinker is handled by the same systems with the exception of reclaiming conveyors, as described later.)

Raw Mills The feed system for all three mills is identical, and is designed so that each mill is supplied from a separate group of four bins. Handling is the same whether the mill is on raw or finish grind. Material is drawn from each bin onto a Merrick Feedoweight for proportioning of mix constituents which are then placed on a 24-in. belt conveyor for direct mill feed.

Primary compartments of the Compeb mills are approximately 9 ft. 8 in. long, and the secondary sections 24 ft. 4 in. The mills are operated at about 17 r.p.m. with drive furnished by 2,500-hp. Canadian G-E synchronous motors through Fawick air clutches. These low starting torque motors and clutches bring the mills up to speed in about 10 seconds without power surge. Each mill is closed-circuited through a pair of bucket elevators and following Airslides to a pair of 16-ft. Raymond separators. The circuits also incorporate an 18,000 c.f.m. Norblo collector for each separator and a third unit (10,000 c.f.m.) servicing the elevators and other vent points.

Mill charge consists of approximately 285,000 lb. of 1- and 2-in. balls, and 114,000 lb. of 2½- to 3½-in. balls. Rated production is 150 tons of material per hour. Separator rejects are recycled to the mills *via* Airslides while the finished raw grind—77 percent passing 200-mesh—is delivered to one of a pair of Fuller-Kinyon pumps. Both mills

No. 1 and No. 2 are provided with two of these pumps, one of them being a 10-in. unit used to handle raw ground material and the other (8-in.) cement when the first two mills are also placed on finish grind operation. Mill No. 3 is always on finish grind, and needs only the one 8-in. pump in its circuit.

On the side of the mill room opposite the feed bins is a row of four lime dust storage silos. These contain material which is recovered in the kiln dust collectors, and is pumped through a Fuller-Kinyon line from the kiln. As needed, the dust is drawn from these silos and delivered by 8-in. pumps to Fuller constant head feeders and then *via* screw conveyor and Airslide to the air separators in the first two milling circuits (when these are on raw grind operation).

Control of all three milling circuits, plus raw material handling, feed system, and product distribution is handled from a central console in the mill room. In line with current practice, the control panel carries schematic flow diagrams in conjunction with the mill operating instruments, recorders, and system indicator lighting.

Kiln Feed Raw mill products transferred from the mill department through 10-in. Fuller Kinyon lines are placed as required in a pair of blending silos. Each of these accommodates about 2,500 tons of material and is equipped with a Fuller quadrant aeration system. Blended mix, adjusted in accordance with raw grind analyses on all constituents, is transferred by Airslides and 10-in. F-K pumps to an accompanying pair of reserve silos with individual capacities of 4,500 tons.

The blended mix may also be sent directly from the blending silos to the kiln feed tank. Together, the blending and reserve silos provide a storage equivalent to kiln feed requirements for four days.

Corrected kiln feed is pumped from either the blending or reserve silos through a 12-in. F-K line to a feed box above a Fuller Airlift constant head feed tank. The predetermined quantity of feed is delivered to a pair of 24-in. variable-speed screw conveyors, and these are followed by a pair of constant-feed 24-in. heavy-duty screws that pass through the kiln feed end housing directly into the kiln.

Kiln Operation Supported on riding gear mounted on seven piers, the kiln is provided with dual drive from a pair of Canadian G-E 200-hp. d.c. motors through Falk reducers. The drives are installed on the central pier, and the kiln is normally operated at about .95 r.p.m. In the first pier, at the feed end, a dust bin and a 7-in. F-K pump are provided for transfer of lime dust to the storage silos in the mill room noted previously.

The kiln is routinely fired with natural gas, but it has a stand-by fuel oil system for emergency firing. Firing temperature is maintained at about 2,500 deg. F., the primary air entering with the fuel flow. Secondary air, at about 900 deg., is received through the firing hood from the cooler throat.

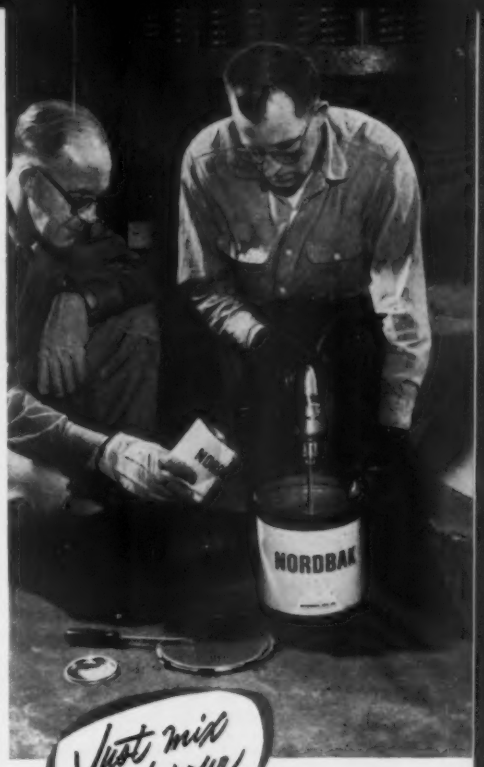
At the feed end, kiln exhaust enters a large flared duct installed between the feed end housing and the initial dust collection units. At entry, the gases have a temperature of approximately 1,200 deg. Tempering air introduced through a series of louvre dampers in the end housing drop this temperature to 600-700 deg. Gases also lose considerable velocity in passage through the duct, and drop the heaviest dust before entering the following dust collection system.

The Precipitation Company of Canada installation is comprised of three sets of Multiclones arranged in parallel, followed by a two-section Cottrell electrostatic precipitator. One set of the Multiclones (or more) may be isolated in case of lower-than-capacity kiln operation, and similar isolation of either precipitator section facilitates maintenance in those areas.

There are four collecting screws beneath the precipitator, another under the Multiclones, and three more below the exhaust ductwork. These transfer dust to a set of four larger screws in which this material is placed in a reject compartment or the F-K pump compartment of the bin contained in kiln pier No. 1.

Cleaned kiln gases are exhausted

Enter 143 on card, page 241 →



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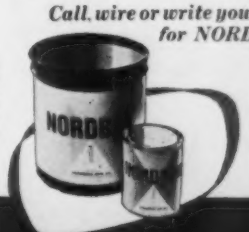
Tough, Resilient, Non-Metallic

Here it is! NORDBAK . . . the manganese backing you pour at "room temperature." You simply mix the contents of two cans together and pour!

Field tests and on-the-job experience show that NORDBAK really works! Because it's resilient and non-shrinking, it provides excellent backing. It's so tough that in a prolonged test the manganese wore through in spots, but NORDBAK remained uncracked. It's easily removed at changeout, too. You can store NORDBAK at your operations . . . get a supply to keep on hand, ready for the next time you replace liners.

Call, wire or write your order for NORDBAK!



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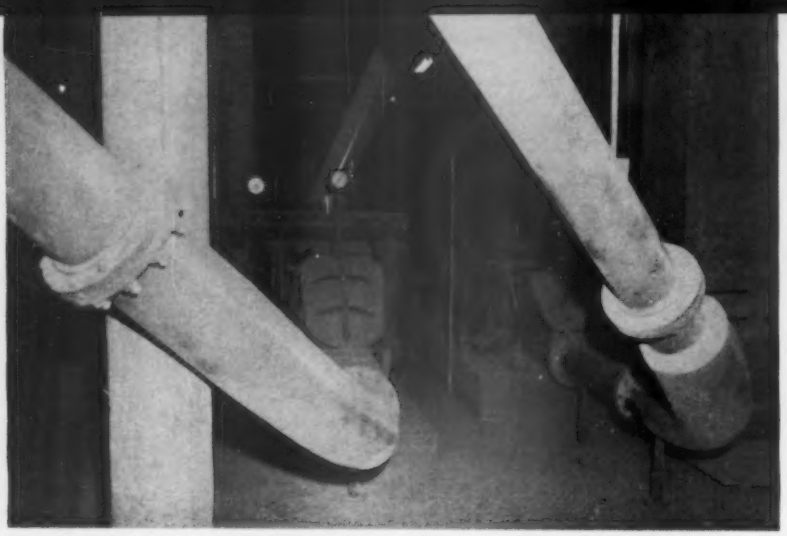
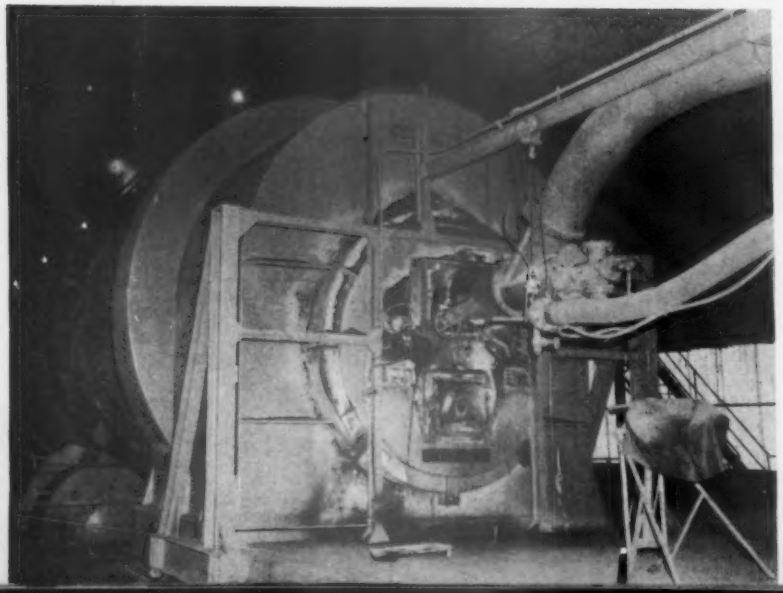


TWO PUMPS, as seen here, are provided for two of the milling circuits. The larger pump handles raw-ground material, and the smaller delivers cement. In the third mill circuit only one pump is necessary, since that mill is always on finish-grind.

KILN CONTROL is centered in a room on the firing floor. The instruments and controls installed here handle the kiln operations, exclusively. All other controls for the plant are installed on a panel shown in another illustration.



THE KILN HOOD, with its burner and fuel supply lines. Natural gas is routinely used for firing, but a fuel oil system is available for emergency firing.

to the 400-ft. stack by a pair of fans with 200,000-c.f.m. ratings at 700 deg. These fans, and those related to the cooler operation described later, are all 300-hp. aerofoil units, and all are equipped with variable-speed drives. Two prime reasons for this type of fan and drive were the saving in horsepower requirements, and maximum draft control throughout the combustion system. In view of the size of the kiln, the latter was particularly significant.

Within a few months after initial firing, fuel consumption was already dropping to a rate near that of planned normal operation — 750,000 B.t.u. Related data include 1.5 percent 0_2 (max.), and hood draft of 1.2 in. water gauge.

The kiln is lined throughout with 9-in. refractories. Starting from the feed end, these are comprised of 140 ft. of Duro, 130 ft. of HW Special, 100 ft. of Dean, 90 ft. of CRL-70, 69 ft. of Magnecon (firing zone), 15 ft. of CRL-70, and 6 ft. of Dean.

Kiln operations are controlled from a master panel housed in an air conditioned room on the firing floor—the other of the two "nerve centers" from which the innumerable operating and handling phases of the over-all installation are regulated. In addition to standard Bailey Meter draft and temperature controls, automatic sequences provided involve constant hood and induced-draft control (through the variable-speed fan drives) and cooler bed depth control. The control panel is also connected by telephone circuit with such critical areas of kiln operation as the feed end, drive, and cooler.

Clinker Cooling, Storage As discharged from the kiln, clinker is received on an underlying 7½- by 120-ft. Canadian A-C horizontal air-quenching cooler comprised of two 60-ft. sections. Each section is driven by a 30-hp. motor. An Industrial Nucleonics Ac-

curay bed level sensing unit is installed on the first section; it controls the depth of clinker on the cooler grate to a predetermined level. The constant bed level assures uniform static pressure in the cooler, and also uniform air flow.

Cooling air is delivered under the grate from a 238,000-c.f.m. blower at 4-in. S.P., and the cooler is vented *via* an exhaust fan with a 250,000 c.f.m. rating at 275 deg. F. and 4-in. gauge. The latter draws the air through a Multiclone collector before exhausting to atmosphere.

After passing through a breaker at the discharge end of the cooler, the clinker is received on the first of a 6-section 24-in. belt conveyor system on which it is transported to the clinker storage hall. A Merrick Weightometer installed on the second conveyor section records the tonnage of material *en route* to storage.

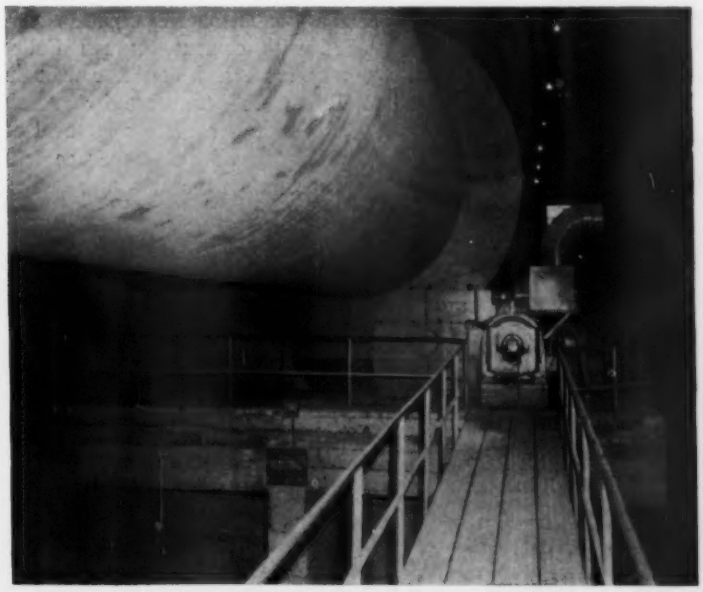
The final two sections of the clinker conveyors are tripper units. One of these is installed on the top of the silos forming the north wall of the storage silo rectangle. It receives material from the last inclined conveyor coming up from the cooler floor, and in turn discharges to the final belt, which is fitted on a conveyor bridging the clinker storage area. This bridge conveyor is rail-mounted, permitting the tripper unit to discharge directly into any part of the 100,000-ton capacity storage hall.

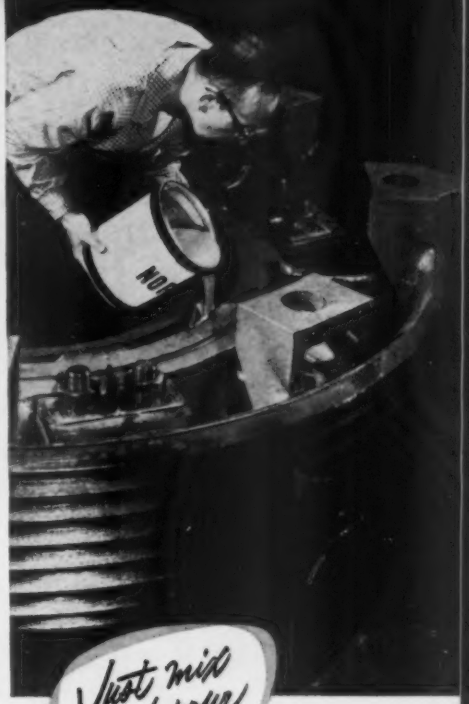
Finish Grind Recovery of clinker from storage for transfer to finish grinding is nearly identical to the system handling raw-grind constituents. The two reclaiming conveyors are 471 ft. long and fitted with 24-in. belting. Similarly to raw materials, clinker is drawn through slide gates onto belt feeders for transfer to the parallel reclaiming conveyors. The subsequent handling system, incorporating bucket elevators and distributing conveyors, was described earlier.

However, in contrast to the raw-material handling, clinker may be placed in the feed bins of all three mills. Gypsum required in finish grinding is delivered to the mill feed-handling and distribution system by the reclaiming conveyors under the raw-material storage silos. In addition to mill No. 3, which is always on finish grind, only mill No. 2 would normally be supplied with finish-grind materials.

Products of the one (or more) finish-milling circuits in operation at a given time are ground to a fineness of 3200 Blaine, and are

A VIEW OF THE KILN DRIVE PIER, with the dual 200-hp. motors and reducers. This is the central pier of the seven.





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It's Simple, Safe and Sure...

It had to happen . . . someone was bound to find a way to end the problems of backing manganese crusher parts with molten metal!

Now . . . you can do it with NORDBAK!

It's mixed at "room temperature" and poured right from a can into the crusher cavities. Gone is the need for special melting and pouring equipment . . . and gone are the hazards of pouring hot metal.

An initial, low cost order to back one set of crusher parts will prove the many advantages of NORDBAK . . . *call, write or wire your order today!*

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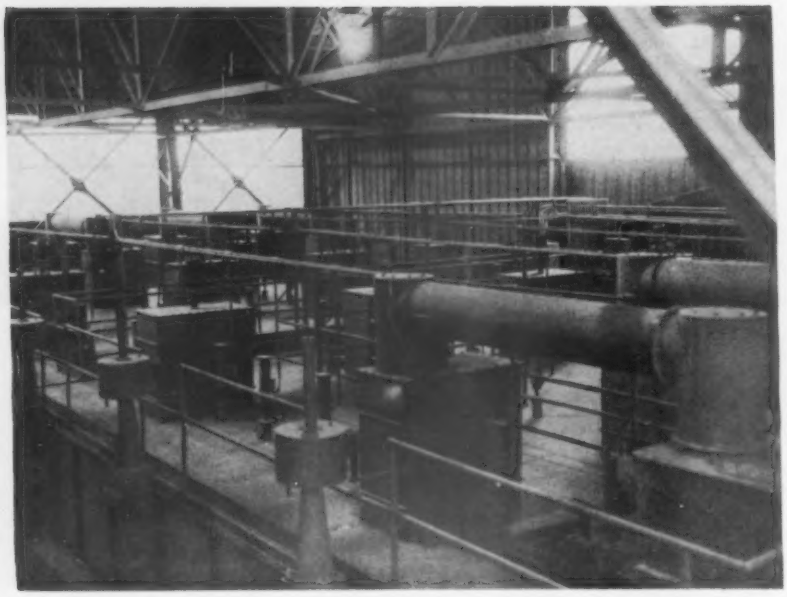
N261-1/3 II

NORDBERG MFG. CO.

Milwaukee 1, Wisconsin

TEMPERING AIR is introduced into the kiln end housing through these louvre dampers. It reduces the temperature of the kiln exhaust from about 1,200 deg. F. down to 600-700 deg. before the gases enter the first dust collection system.



THIS 2-SECTION ELECTROSTATIC PRECIPITATOR is preceded by mechanical collectors in the kiln dust collection installation. Cleaned kiln gases are exhausted to a following 400-ft. stack by a pair of 200,000-c.f.m. fans.

THIS BETA RAY INSTRUMENT installed on the first section of the cooler senses the bed level of the clinker and controls the depth of the material to a predetermined level.

delivered from the separators in each circuit to the respective 8-in. F-K pump. In this respect alone the No. 3 circuit differs from the others —it has but one pump, for cement, while the other two have one for cement and one for raw mix. The cement from mill No. 3 may be pumped to either storage or directly to the shipping silos. The other two pumping lines deliver only to storage.

Cement Storage Distribution Thirteen silos are set aside for cement storage and, like their companion units on the raw-material side, have 5,000-ton capacities. Below the cement silos a mobile 10-in. F-K pump is spotted under any drawpoint as desired, and the product is then transferred to the four shipping silos.

The latter are 80 ft. high, and each accommodates 4,000 tons of material delivered from the pumping line through rotary valves. Above the silos are standard Norblo dust collecting and alleviating equipment.

Five of the truck-loading stations at the shipping silos incorporate retractable loading spouts which are supplied with cement through plug valves in the silo bottoms and Airslides. Two more bulk truck-loading points are equipped with Toledo scale batching hoppers which are filled *via* Airslides, and also discharge through retractable spouts.

Each of the two packing stations has a 4-spout St. Regis packer supplied with cement through Fuller rotary feeders. Material caught in spill hoppers is transferred *via* screw conveyor to screens for removal of any debris, and the cleaned cement passes through the alleviator before re-entering a silo. Bagged cement is moved from the packers to the loading dock on Power-Curve conveyors. All spouts, batchers, and packer bins in the nine loading stations are equipped with Dracco dust collectors.

Material Checks Quality control over material in process involves a comprehensive program. Among the hourly tests are Ca0 determinations on sand and shale, analyses of all raw grind

constituents before adjusting raw mix, testing of kiln feed samples, checks of clinker samples (liter weight and CaO), and tests on samples of cement from both the bulk and bag-loading points.

Daily composite samples are made up of both clinker and cement, and analyses of cement are made twice per shift for Blaine and sulphate determinations. In addition, the laboratory carries out routine physical tests. Samples are also taken of the kiln dust for testing before it is transferred to the lime dust storage silos in the mill department.

Company Officers Since the company was acquired last year, executive changes made include the appointment of the Rt. Hon. Louis St. Laurent as chairman of the board, and Louis A. Lapointe and Fred H. Ernst as president and general manager, respectively.

Directly concerned with operations are Honoré Hudon, manufacturing manager (including production in all other M.C.L. operations); Mr. Hudon's assistant, Leo Fortin; and Lucien Mongeon, plant engineer.

Dewey's Tulsa Plant

(*Concluded from page 135*)

ager. Others include Harold L. Egger, assistant plant manager; Clarence Hartwig, general operating foreman; J. O. Baber, plant chemist; Gene Toney, master mechanic; Homer Leffler, electrical foreman; A. R. Gibson, quarry foreman; William Anderson, shipping foreman; C. B. Kietzman, plant engineer; and Jack Gathright, instrumentation engineer.

Fred B. Hunt is vice-president in charge of operations, and J. H. Reichenbach is chief chemist of the company. George Koonsman, American-Marietta cement engineer, was in charge of construction for A-M.

Compressed Air-Gas Manual Published in Third Edition

Compressed Air and Gas Handbook, a third edition, has been issued by the Compressed Air and Gas Institute, Cleveland, Ohio. Data is presented in the simplest manner consistent with the material, which was prepared by engineers and specialists from industry. Tables and graphs accompany the text; and the work has been indexed and cross-referenced for utmost usability.

This newly published expanded edition, valuable to managers, operators, and other personnel whose work involves any phase of the compressed air or gas industry, is available for $8 a copy.

World Wide Cement News

New Mexican Cement Plants To Satisfy Boom Demand

A 3,500-bbl. per day capacity cement plant is scheduled to be built at Casoleacaque, near Minatitlan, near the Gulf of Mexico, on the Isthmus of Tehuantepec, by Cementos del Sur, S. A., a newly formed company. Cost of the plant will be about $5.6 million.

The concern was formed to meet the high cement demand in the state of Vera Cruz, which currently cannot be satisfied by existing plants in that area. An industrial boom is reportedly building up there, sparked by large government construction projects now under way. Construction work on the Minatitlan plant is expected to begin this summer.

At Puebla, in the state of Puebla, cement production is scheduled to begin in August at the new plant of Cementos Atoyac, S.A. Construction of this facility was started in December, 1959.

Cement Capacity Up in Canada Despite Lower Output

Canadian cement production in 1960, according to the Department of Mines and Technical Surveys, Ottawa, decreased to 5,697,859

NORDBAK

It's the modern, effective way to back manganese

Non-metallic NORDBAK streamlines crushing operations of every kind. It's as easy to use out in the field as it is in the plant. You mix it and pour it right on the job...*wherever* your crusher is. No need for special melting or pouring equipment.

NORDBAK fills extremely narrow voids and is only ¼ the weight of metallic backing agents. Conveniently packaged, NORDBAK is *the one* modern, effective backing agent for manganese crusher parts!

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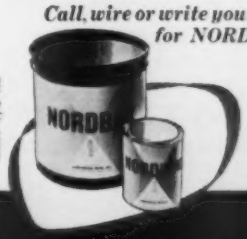

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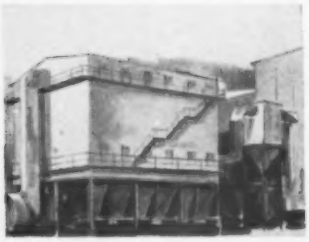

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Three prominent U. S. cement plants, in recent months, have installed Wheelabrator control systems, utilizing glass filter tubes, to ventilate both wet and dry process kilns. Operation to date has been entirely satisfactory—the high collecting efficiencies of the glass tubes handling gases at temperatures up to 550° F. provide a *clean* stack—no visible solids in the discharged gases. Wheelabrator's unequalled experience in the use of glass filter tubes in high temperature filtration applications plus this recent success in the cement industry is proof that you can depend upon Wheelabrator for the best solution to your kiln and other high temperature problems. Write today for complete information.

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short tons from the 1959 total of 6,284,486 tons. However, the 1960 expansions in the cement industry increased productive capacity of 14 percent to 8,500,000 tons.

Several new installations went into production. A highly automated plant was completed for Miron & Freres, Ltd., in St. Michel, Montreal. Capacity of the Edmonton, Alta., plant of Inland Cement Company, Ltd., was increased 50 percent by the addition of a 340-ft. kiln. The Regina plant of the Saskatchewan Cement Company was also enlarged.

From a position of a cement importer, Canada has progressed in the industry until it is now exporting minor quantities of cement.

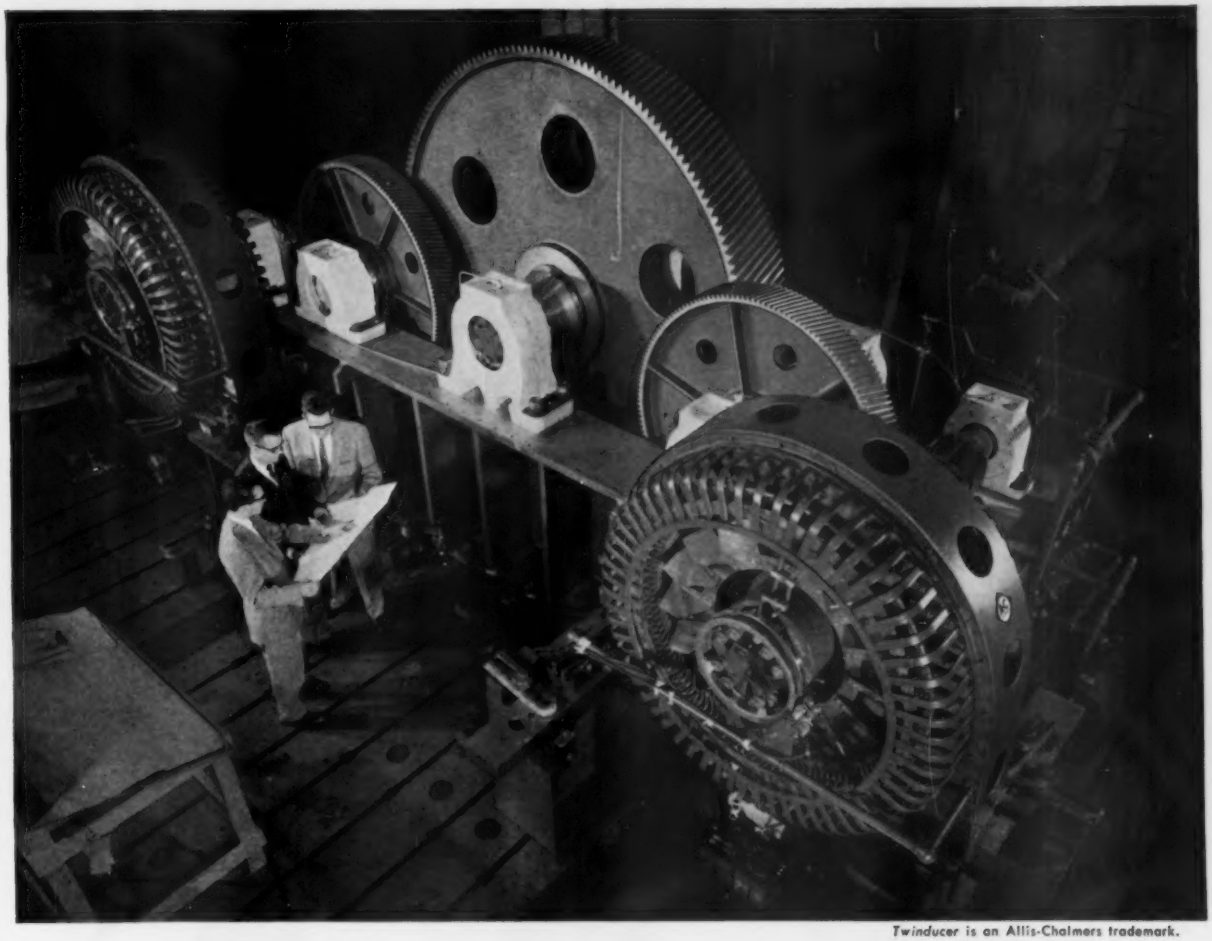
Cement production in Italy in 1960 reached a total of 15,560,000 tons, an increase of 1,300,000 tons over the previous year's output. Italy has the second-highest place among OEEC cement producing countries. The announced total for 1960 represents about 80 percent of capacity of all of Italy's cement plants.

Associated Portland Cement Manufacturers, Ltd., United Kingdom, in collaboration with the government of Ghana, will build a cement plant at Bonyere, west of Takoradi, to produce cement clinker from the local limestone at the rate of 100,000 tons annually. A grinding plant will be erected at Tokoradi.

JOHN J. JOYCE has been promoted to the position of New York district sales manager for Hercules Cement Company, Division of The American Cement Corporation. He has been with the firm for 15 years.

FRANK L. LOVELL was elected vice-president of the Louisville Cement Company by its board of directors. He has served the company as salesman, assistant sales manager, and sales manager.

ALLIS-CHALMERS



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Full-load demonstration proves 98%-plus efficiency of Twinducer grinding mill drive

New, twin-motor drive system divides mill load electrically, saves space and installation costs, extends gear-train life.

To show the high efficiency of the *Twinducer* drive, Allis-Chalmers engineers recently conducted a series of full-load demonstrations at the factory.

Full load was simulated by coupling two *Twinducer* drives. Driver unit was coupled to driven unit. Load on driven unit was two equally loaded generators.

Power input to the motors was measured, and compared with the output of the generators. Efficiencies (exclusive of ordinary motor and generator power losses) were found to range from 98.48% to 98.52% . . . more than twice the efficiency of most conventional mill drives.

The *Twinducer* drive balances the load electrically, through a unique, angular rotor shift of one motor. Result is a drive arrangement that takes less space than other trunnion drives . . . and facilitates automation of grinding equipment. *Twinducer* drive cuts maintenance costs, conserves power requirements and greatly extends gear-train life.

For complete information on the new *Twinducer* drive system, see your A-C representative. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wis.

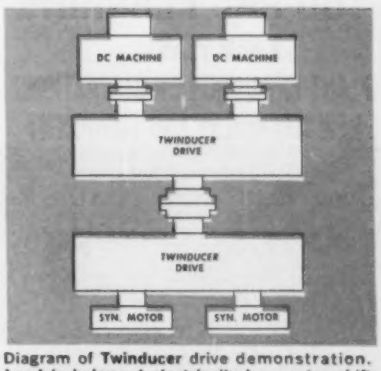

Diagram of **Twinducer** drive demonstration. Load is balanced electrically by a rotor shift mechanism in one of the twin synchronous drive motors. A-1514

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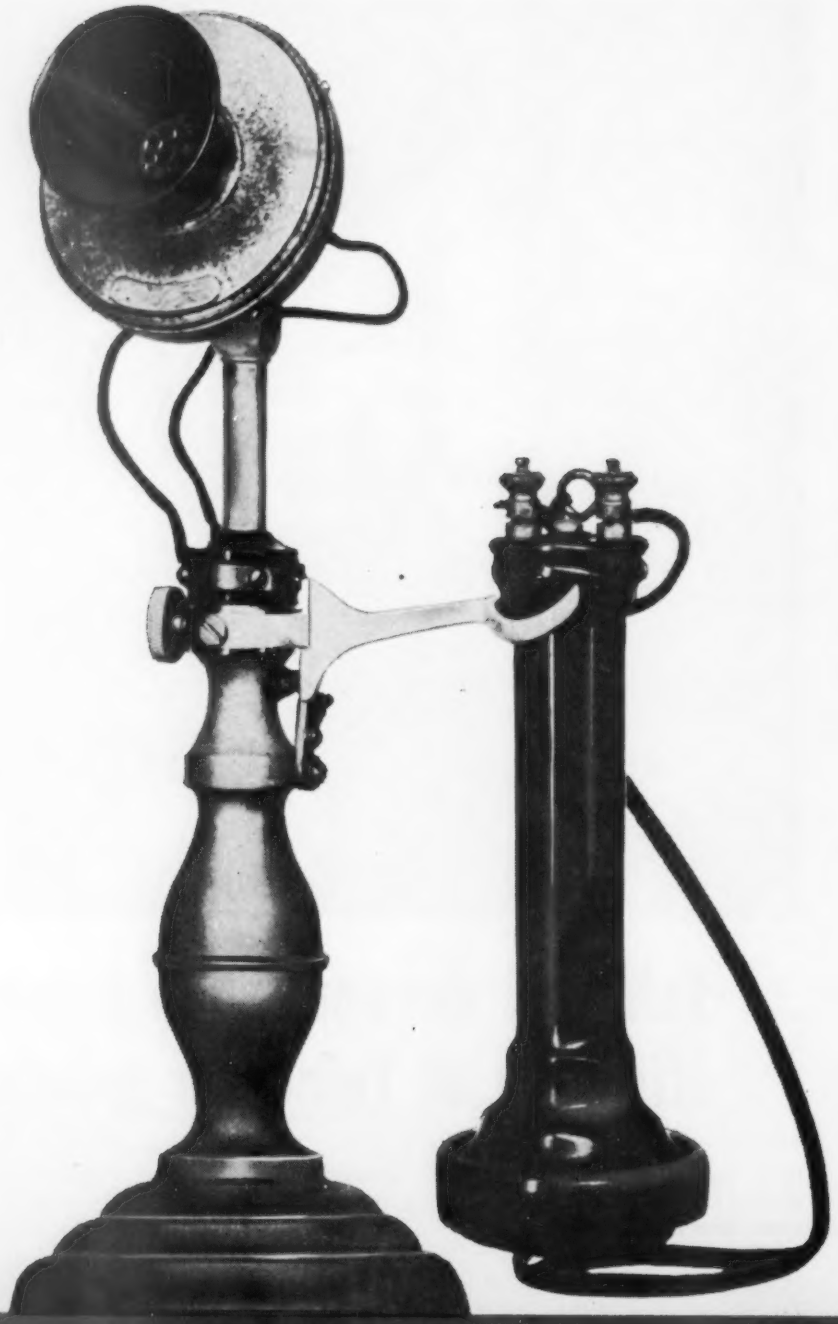

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Heat Transfer Systems for Dry-Process Kilns in Cement Manufacturing

Part I

SYNOPSIS

IN RECENT years numerous systems for improving heat transfer in dry-process kilns have been the improvement of fuel usment industry. One objective has been the improvement of fuel usage, and at the same time obtaining higher production rates, as compared to straight kilns. These systems may be divided into two groups—(1) external, with counter-current flow of solids and hot gases, and, (2) internal, with surface exposure and radiation as the means of heat transfer.

This trend to systems of this type could be compared to the trend toward waste-heat-boilers with dry-process kilns, nearly 40 years ago. One prime objective, both then and now, is better utilization of heat in the exit gases.

By J. RICHARD TONRY*

INTRODUCTION

For many years the dry-process kiln predominated in the cement industry. In comparison to present day kilns, it was a comparatively small unit. It operated with a high exit gas temperature, and for its size it was capable of a high production rate. When the price of fuel began to increase, the natural development was toward some means of recovering some of this lost heat going out the stacks. The waste-heat-boiler became the answer, and many systems were installed with the dual purpose of generating power and producing clinker.

Present-day plants usually no longer need this generated power when new installations are made; but the need for improved fuel economy still exists. To solve this problem of heat transfer, numerous devices have been installed in less than ten years. These are:

1. The suspension preheater (Figure 1), which preheats the kiln feed to about 1200-1400 deg. F. by counter-flow of kiln gases. Two arrangements of this equipment have been installed — the Fuller-Humboldt, with heat transfer vessels arranged in a vertical manner; and the F. L. Smidth, with heat transfer vessels arranged in a dual, concentric manner. (Figure 1a)

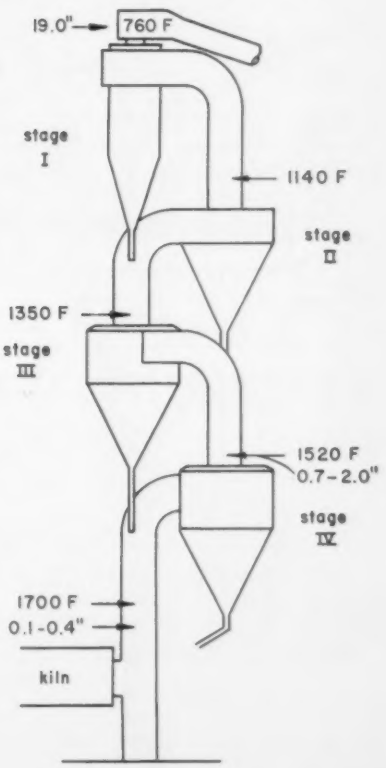
2. The moving grate (Figure 2), which dries, preheats, and partially calcines pellets of raw feed, reaching temperatures near 1600 deg. F.

3. The internal heat exchanger (Figure 3), which preheats the raw feed by contact with the metal partitions installed in the feed end of the kiln, and by radiation from the hot end of the kiln, as well as by heat transfer of the fine material entrained in the exit gases.

4. The closed coil-type of heat exchanger (Figure 4), which heats the raw mix by heat conduction through the walls of the tubes.

5. The internal chain systems (Figure 5), which preheat the feed by heat transfer from the exit gases

Fig. 1—F-H suspension preheater gas temperatures and pressures. Kiln size, 11 × 175 ft. (gas-fired). Bbl. per hour per MCF, 12.1. B.t.u. per hour MCF, 9.66 × 10⁶. B.t.u. per bbl., 800,000. Water cooling tower used for exit gases.



*Senior manufacturing engineer, Portland Cement Association.

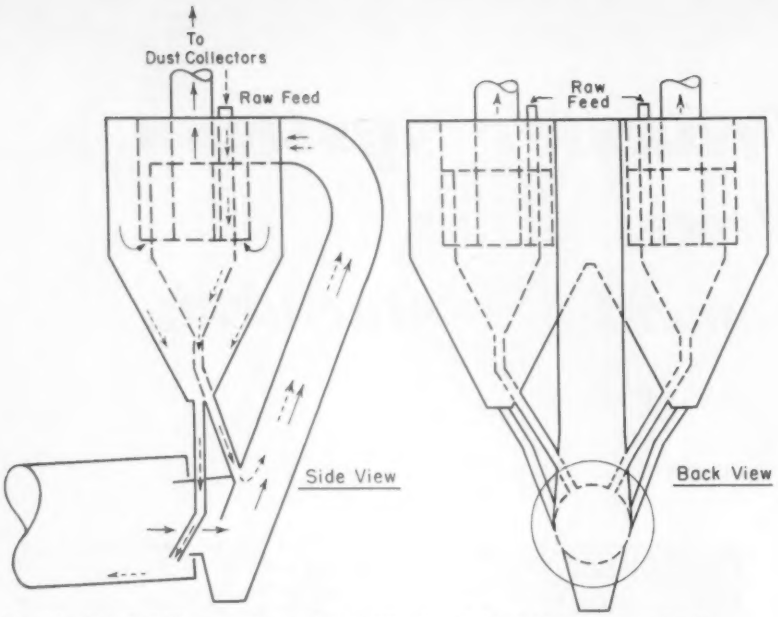


Fig. 1A—F. L. Smidth suspension preheater. Kiln size, 10 × 12 × 310 ft. (gas-fired).

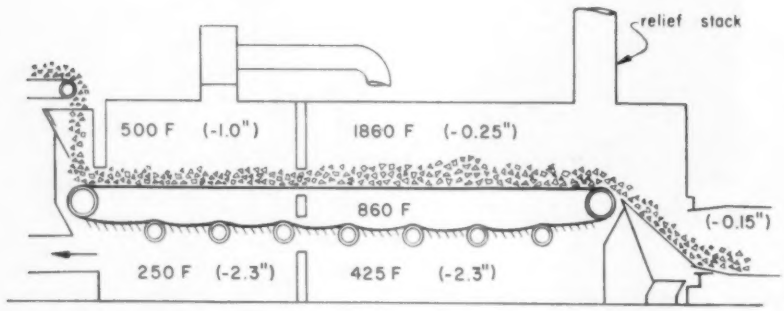


Fig. 2—Double-pass grate temperatures and pressures. Kiln size, 12½ × 160 ft. (coal-fired). Bbl. per hour per MCF, 9.4. B.t.u. per hour per MCF, 6.6 × 10⁶. B.t.u. per bbl., 695,000.

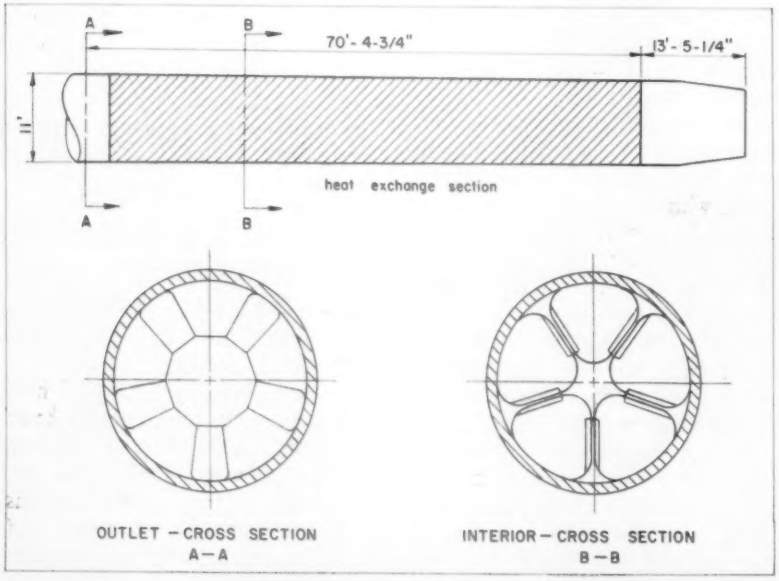


Fig. 3—Five-chamber heat exchange sections. Kiln size, 11 × 390 ft. (gas-fired). Bbl. per hour per MCF, 3.7 (4.7, based on kiln volume below heat exchanger). B.t.u. per hour per MCF, 3.22 × 10⁶. B.t.u. per bbl., 870,000.

through the chains, which are also exposed to radiation from the hot zone in the lower end of the kiln.

Some of these heat transfer devices have been installed with rotary kilns as complete, new systems, and others have been added to existing kilns. In some cases, a preheater has replaced a waste-heat-boiler, or has been installed in an arrangement parallel to an existing waste-heat-boiler.

Comparison of the many systems is difficult because of differences in raw materials, fuels, and general arrangements. In order to make possible an over-all evaluation of the respective systems, two arbitrary units were calculated. Kiln volume was calculated in units of 1,000 cu. ft. and fuel consumed in 1,000,000 B.t.u. per hour. These figures were then related to hourly production rates. In this manner all of the assembled information could be consolidated into one table (page 153).

HEAT TRANSFER BY INTERNAL RADIATION

In the clinkering process heat released from the fuel being burned is transferred to the material in the kiln system (1) by radiation from flame to load, (2) by gas-solid contact, and (3) by conduction from lining, pipe walls, and internal surfaces. Some of this heat is radiated by the flame in the kiln to the lining, the load, and the coating in the hot zone.

At the upper end of the flame, this radiation (Ri) passes into the gas-filled volume of the upper end of the kiln. Considering only the internal portion of the kiln system, this occurrence is demonstrated by Figure 6. According to the methods of Geoffrey Martin, 42 percent of the total heat release is transferred as internal radiation in this manner.

From this internal radiation (Ri) comes the heat for drying, calcination, and the heat absorbing reactions prior to clinkering. Clinkering takes place in the hot zone of the kiln with direction radiation from flame and indirect radiation from the kiln interior. Heat trans-

Hourly Rates per 1,000 Cu. Ft. Kiln Volume
(Inside 6-in. Lining and Fuel Usage)

System	Bbl. Clinker	Fuel Burned B.t.u. × 10^6	Fuel Burned B.t.u. per bbl.
Suspension preheater	7.6 to 13.4	5.1 to 9.7	660,000 - 800,000
Internal crosses*	3.7 to 4.8	3.1 to 3.9	700,000 - 870,000
Chains*	5.9	5.7	910,000 - 1,000,000
Grate	9.0 to 9.4	5.8 to 6.6	640,000 - 695,000
Coil	7.6	5.2	687,000
Straight kilns	3.6 to 6.8	2.9 to 6.6	898,000

*Note: A kiln with internal heat exchanger will show a higher production-volume ratio when the volume is computed on the section of the kiln below the heat transfer section, instead of the entire kiln volume. This would treat the kiln as being composed of two separate portions: (a) feeding and preheating, and (b) calcining and clinkering.

fer devices for capturing this radiated heat are the internal crosses and chains, as seen in Figure 7.

The grate-type preheater captures a part of this heat at the discharge end and possibly on the pellet surface of the load on the grate. The suspension preheater is constructed in such a manner as not to utilize this direct radiation, as is the coil preheater. Indirect radiation due to hot surfaces induced by high temperature gases aids in heat transfer in these latter devices.

INTERNAL RADIATION

In consideration of heat transfer systems, it is of interest to calculate the hypothetical distribution of heat in the kiln, following largely the methods of Geoffrey Martin.** Assume that the inner surface of the kiln lining in the hot zone is maintained at clinkering temperature of 2590 deg. F., and that as much heat is radiated at that temperature as is received from the flame; then by calculation the length of this zone can be determined.

Example:

Kiln size: 10-ft. diameter × 175 ft. long (inside lining) with suspension preheater

Heat release: 133 × 10^6 B.t.u. per hour

**Based on calculations from *Chemical Engineering and Thermodynamics Applied to the Cement Rotary Kiln* by Geoffrey Martin, Crosby Lockwood and Son, Stationers Hall Court, Ludgate Hill, E.C. 4.

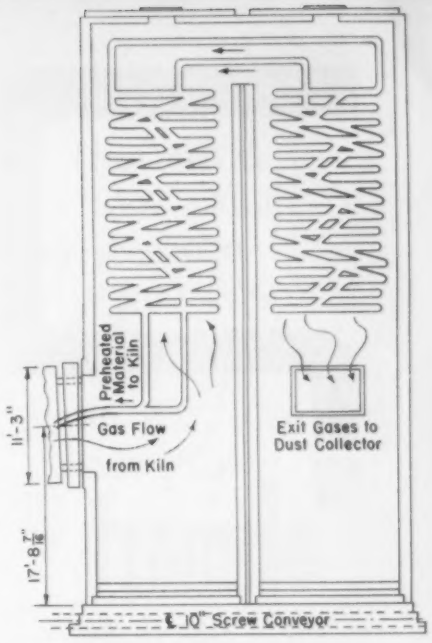


Fig. 4—Coil-type preheater. Kiln size, 11.25 × 200 ft. Bbl. per hour per MCF, 7.6. B.t.u. per hour per MCF, 5.2 × 10^6. B.t.u. per bbl., 687,000.

Production: 4000 bbl. per day

$$\frac{Q}{A} = 0.173\ E\ \frac{T^4}{100}$$

Q = B.t.u./hr. (radiant energy leaving inner surface)

A = Area of surface

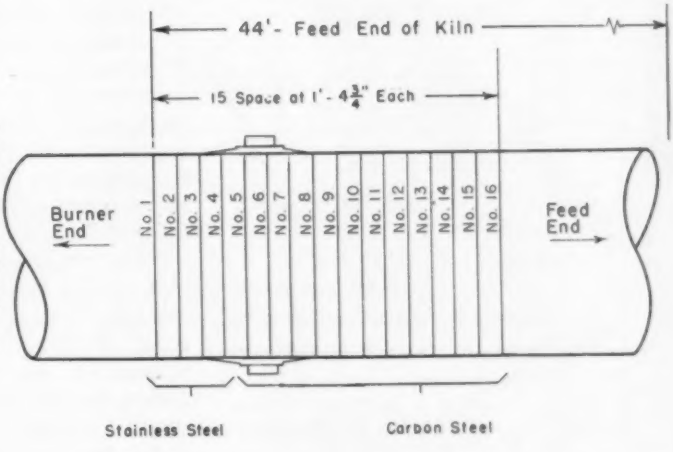
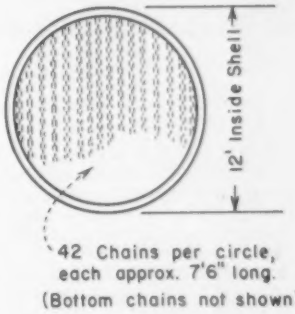


Fig. 5—Kiln chain section. Kiln size, 12 × 350 ft. (gas-fired). Bbl. per hour per MCF, 5.9 (6.7 based on kiln volume below exchange section). B.t.u. per hour per MCF, 5.7 × 10^6. B.t.u. per bbl., 910,000.



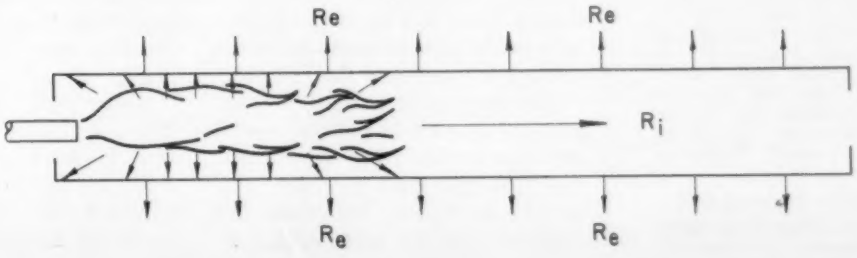


Fig. 6—Heat release from flame.

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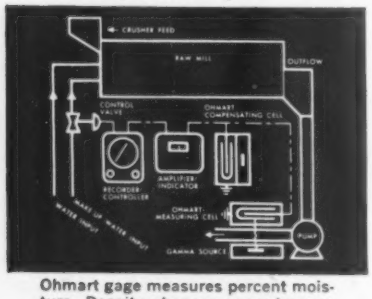

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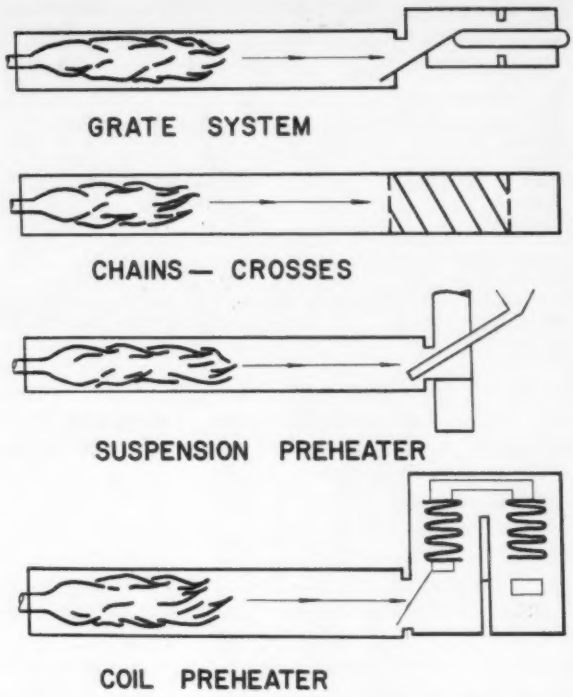


Fig. 7—Hot zone radiation to feed end of kilns.

T = Absolute temperature, °R or 459.7 + F

= Emissivity factor (0.8 for refractories)

$$\text{Then, } \frac{Q}{A} = 0.173 \times 0.8 \; \frac{\left(\frac{2590}{100}\right)^4 + 460^4}{100}$$

$$\frac{Q}{A} = 0.1384 \times 865{,}000$$

$\frac{Q}{A}$ = 119,800 B.t.u./hr. leaving inner surface per sq. ft. at 2590 deg. F.

$Q = 119{,}800 \times A$

By equating this figure to the hourly heat release,

$119{,}800 \times A = 133 \times 10^6$

$A = 1110$ sq. ft. of interior surface at 2590 deg. F.

The length of inner-lining surface, then becomes

$$L = \frac{1110}{10 \times 3.14} = 35.3 \text{ ft. length}$$

of clinker zone

This is a hypothetical figure representing the length of the high heat zone in the kiln. Its value lies in the attempted location of the hot zone.

The theoretical amount of heat required to raise the decarbonated raw mix to clinkering temperature has been calculated as 287 B.t.u. per lb. of clinker. This could be supplied from the heat transfer in the hot zone at 2590 deg. F. in this kiln.

$$\frac{4000 \text{ bbl./day} \times 360}{24}$$

= 60,000 lb. clinker per hour

$60{,}000 \times 287 = 17.22 \times 10^6$ B.t.u. per hr.

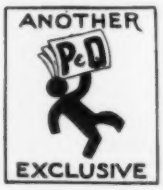
$$\frac{17.22 \times 10^6}{119{,}800} = 144 \text{ sq. ft.}$$

The surface required for this transfer of heat is 144 sq. ft., or about 4.5 ft. of the kiln length. This highlights the short span of time and small space required in a kiln to complete the clinker process at high temperature. In this case, a suspension preheater prepares the load for the kiln.

These hypothetical figures for heat transfer are introduced to accentuate the possibilities of acceleration of the clinkering process through the use of heat transfer devices for fast drying and calcination. Calculated retention time of load in this kiln is about 70 minutes at a speed of 70 r.p.h. These calculations would suggest that an even higher speed and shorter time is possible. Actual retention time in a similar case was 45 minutes.

These heat transfer systems are shown in Figures 1 to 5. Each one is shown from an actual installation and with pertinent operating temperatures and pressures. They will be further discussed in Part II.

Practical Considerations in Pumping Slurry



By STEWART S. FRITTS
General Superintendent
Lone Star Cement Corporation
Richmond, Va.

THE fundamental flow characteristic of cement mill slurries may be considered like any incompressible liquid that is given by the expression:

$$Q = A \times V$$

where Q = quantity of liquid (slurry pulp)
A = cross-sectional area of the conduit or pipe carrying the liquid
V = velocity of flow

The practical use of this expression in pumping slurry, as well as pumping water, is given as:

$$GPM = 2.45\ V\ d^2 \quad (2)$$

where GPM = gallons per minute at 7.48 gal. per cu. ft.
V = velocity of flow—feet per second
d = diameter (internal) of pipe—inches

Slurry Characteristics The transportation of cement mill slurries includes not only the movement of liquid (water) but the movement of suspended solids in the liquid medium.

Table I has been prepared to show the fundamental characteristics of water-solids mixtures with the gallons per minute required to move 1,000 bbl. of equivalent dry solids per hour. The equations for determining pulp density based on the specific gravity of the solids being pumped, as well as the formula for equating flow, are outlined.

The table has been based on a dry solids specific gravity of 2.70. A deviation of 0.10 plus or minus from this value (2.60 to 2.80) does not change the pulp density or the pulp flow by more than 1.7 to 1.0 percent in the region of 30 percent to 50 percent water-solids mixtures. This range of specific gravity and percentage of water meets most problems encountered in cement mill slurries with the exception of clays; and with the high-moisture slurries generally encountered in handling clays the deviations are minus 0.5 percent.

Practical Pipe Diameters The determination of d (diameter of pipe) must be evaluated on the basis of optimum performance, depending upon a reasonable friction factor consistent with an economical selection of available materials.

All liquid media are subject to the controlling phenomenon known as viscosity. For slurries encountered in cement plant operations the flow is not only viscous; it may be plastic. But the fundamental equations of flow can be used provided that due consideration is given to the proper flow characteristic.

Ross W. Smith[1] has presented a rational approach for the determination of the friction factor—as applied to cement-plant slurries—which may be expressed:

$$H_f = \frac{0.8}{p_s}\left[\frac{S_y}{d} + \frac{1.2\ v_p\ GPM}{d^4}\right] \quad (5)$$

where H_f = friction loss—ft. per ft. of pipe
p_s = specific gravity of slurry (pulp)
S_y = yield stress—lb./sq. ft.
v_p = plastic viscosity—lb./ft.-second
GPM = gallons per minute—flow

TABLE I

REQUIRED GALLONS PER MINUTE (GPM) OF SLURRY (PULP) TO MOVE 1000 Bbl. of EQUIVALENT DRY SOLIDS PER HOUR

Based @ 600 lb. Dry Solids per bbl. of Clinker @ 2.70 Specific Gravity of Solids - d_s

% Water %	% Solids 1 - %	Dilution Water:Solids	Pulp Density Sp.Gr. - d_s	Pulp Density #/Cu.ft.	Pulp Flow GPM
10	90	0.111:1	2.308	144.3	580
15	85	0.176:1	2.151	134.4	655
20	80	0.250:1	2.015	125.9	745
25	75	0.333:1	1.895	118.4	845
30	70	0.429:1	1.788	111.8	960
35	65	0.538:1	1.693	105.8	1090
40	60	0.667:1	1.607	100.4	1245
45	55	0.818:1	1.530	95.6	1425
50	50	1.000:1	1.459	91.2	1645
55	45	1.222:1	1.395	87.2	1910
60	40	1.500:1	1.335	83.4	2245
65	35	1.857:1	1.283	80.2	2675
70	30	2.333:1	1.233	77.1	3245
75	25	3.000:1	1.187	74.2	4045
80	20	4.000:1	1.144	71.5	5245
85	15	5.666:1	1.104	69.0	7245
90	10	9.000:1	1.067	66.7	11245

Where $P_s = \dfrac{d_s}{\frac{(100 - \%) + (\% \times d_s)}{100}}$ (3)

$$GPM = \frac{1000 \times 600 \times 7.5}{60 \times 62.5 \times \frac{(100 - \%)}{100} \times p_s} = \frac{1200}{\frac{(100 - \%)}{100} \times p_s} \quad (4)$$

Note: For values of GPM when the Raw Material Factor deviates from 600 lb. per Bbl., multiply GPM x lb. per Bbl./600

[1]See reference (1) at end of article.

d = diameter (internal) of pipe—inches

where experimental data shows:

S_y = 0.20 to 1.50 avg. 0.630

v_p = 0.008 to 0.045 avg. 0.020

These values are also dependent on the pulp specific gravity or dilution. Therefore, the higher the specific gravity (pulp) and the lower the pulp dilution, the higher the yield stress (S_y) and the plastic viscosity (v_p).

Normally, the expression 1.2 v_p GPM/d^4 represents 5 to 10 percent of the total friction head. Therefore, the head loss due to friction may be expressed practically on the following basis:

$$H_f = \frac{0.9\ S_y}{p_s\ d} \quad (6)$$

Under normal operating conditions the attempt is to pump slurry at the lowest allowable moisture content, which means that the value of S_y will be at the maximum. Therefore, in the absence of confirming data, the expression may be roughly evaluated as:

$$H_f = \frac{1}{2\ d} \quad (7)$$

With the above expression (7) for the friction factor, the value of the first approximation of d or size of pipe may be determined as:

$$d = \sqrt[6]{\frac{GPM^2\ (L + 200)}{20\ H_s}} \quad (8)$$

where d = diameter of pipe—inches
GPM = gallons per minute—flow
L = total length of pipeline—feet
H_s = net static head—feet
200 = allowable equivalent length for various valves and fittings—feet
20 = flow constant that has been evaluated on the basis of optimum flow with the friction factor per equation (7)[2].

After the first approximation has been made, it is important to establish the final selection of the pipe on a rather liberal basis. For example, if the value of d is calculated at 6.5 in., the pipe size selected should be 8 in., the next larger standard size. While the initial cost of the 8-in. pipe, plus its installation cost, would be higher than the 6-in. pipe, the over-all economy of the 8-in. pipe would be realized in terms of a lower friction loss and therefore lower total equivalent head, which in turn would result in lower horsepower.

In selecting the various valves and fittings at and near the pump, the size of the pump discharge would govern the selection. The wear factor on valves and fittings in pumping slurry can be very high, and the cost of replacement could be expensive. Therefore, the optimum size of fittings would be near the size of the pump discharge connection.

Table II has been prepared—based on equation (8)—for ready reference in selecting the optimum pipe size.

[2]See reference (2).

TABLE II

SELECTION OF PIPE SIZE BASED ON EQUATION (8)

Assume H_s = 50 ft.

	Length of Pipeline = L in ft.										
GPM	100	200	300	400	500	600	700	800	900	1000	GPM
50	3"	3"	3"	4"	4"	4"	4"	4"	4"	4"	50
100	4	4	4	4	4	5	5	5	5	5	100
200	5	5	5	5	5	5	6	6	6	6	200
300	6	6	6	6	6	6	6	6	6	6	300
400	6	6	6	6	8	8	8	8	8	8	400
500	8	8	8	8	8	8	8	8	8	8	500
600	8	8	8	8	8	8	8	8	8	8	600
700	8	8	8	8	8	8	10	10	10	10	700
800	10	10	10	10	10	10	10	10	10	10	800
900	10	10	10	10	10	10	10	10	10	10	900
1000	10	10	10	10	10	10	10	10	10	10	1000
1200	10	10	10	10	10	12	12	12	12	12	1200
1400	10	10	10	10	10	12	12	12	12	12	1400
1600	10	10	12	12	12	12	12	12	12	12	1600
1800	10	10	12	12	12	14	14	14	14	14	1800
2000	12	12	12	12	12	14	14	14	14	14	2000
2500	12	12	12	14	14	14	14	14	14	14	2500
3000	12	12	14	14	14	14	14	14	14	14	3000
3500	14	14	14	14	14	14	14	14	14	14	3500
4000	14	14	16	16	16	16	16	16	16	16	4000
4500	14	14	16	16	16	16	16	16	18	18	4500
5000	14	16	16	16	16	18	18	18	18	18	5000

Power Requirements The power required to move slurry through a pump and pipeline is given by the following:

$$HP = \frac{GPM\ H_t\ p_s}{3960\ E_p\ E_m} \quad (9)$$

where HP = total hp. required to pump slurry
GPM = gallons per minute—flow
H_t = total head—feet or net static head plus friction head
p_s = specific gravity of slurry (pulp)
E_p = mechanical efficiency of pump
E_m = electrical and mechanical efficiency of motor and V-belt drive

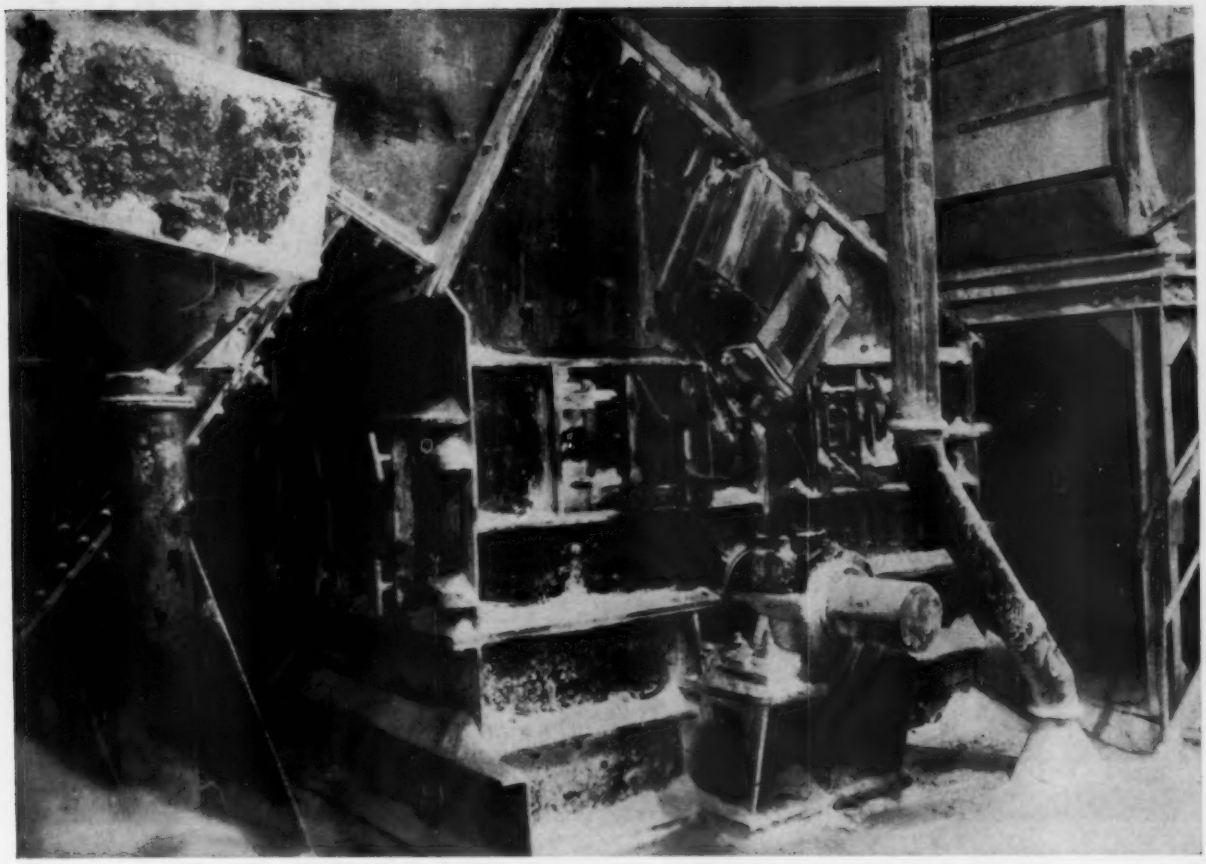
Practically speaking, with a normal pump efficiency of 60 percent and a motor plus V-belt drive efficiency of 85 percent, the value of HP may be equated as:

$$H_p = \frac{GPM\ H_t\ p_s}{2000} \quad (10)$$

Pump Selection Final selection of a slurry pump should be discussed with the experienced pump manufacturer, and his recommendations should be carefully considered along with the practical experience of the operations.

References 1. Smith, Ross W., *Flow of Limestone and Clay Slurries in Pipe Lines*, A.I.M.E. *Trans.*, Vol. 217, p. 258 (1960).

2. Hamm, Hans W., *Determination of Economic Pipe Line Diameters*, in *Plant Maintenance and Engineering*, p. 31, November, 1960.



JOY-Hazemag Impact Crushers produce uniform products in limestone operation

Joy-Hazemag Impact Crushers are ideally suited for the cement industry because of the high reduction ratios and the very uniform product. Reduction ratios up to 50:1 can be achieved, and crushers with capacities up to 500 tons-per-hour are available in the Joy-Hazemag line.

In addition to the operating advantages of the Joy-Hazemag Impact Crushers there are good, sound economic reasons for their use in the cement industry. They offer very high capacity per dollar of invested capital compared with other types of crushers and pulverizers creating 10 mesh products. Large access doors give easy accessibility, maintenance is simple and wear rates are low. The large, heavy rotor of the Joy-Hazemag Crusher gives a "flywheel" effect, for smooth operation and low power consumption.

Joy-Hazemag Impact Crushers will provide a better crushed product at lower cost in any limestone crushing operation. For details on how they can save you money, consult your Joy representative or write for Bulletin 3295-26.

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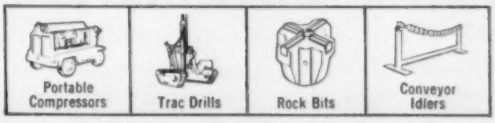

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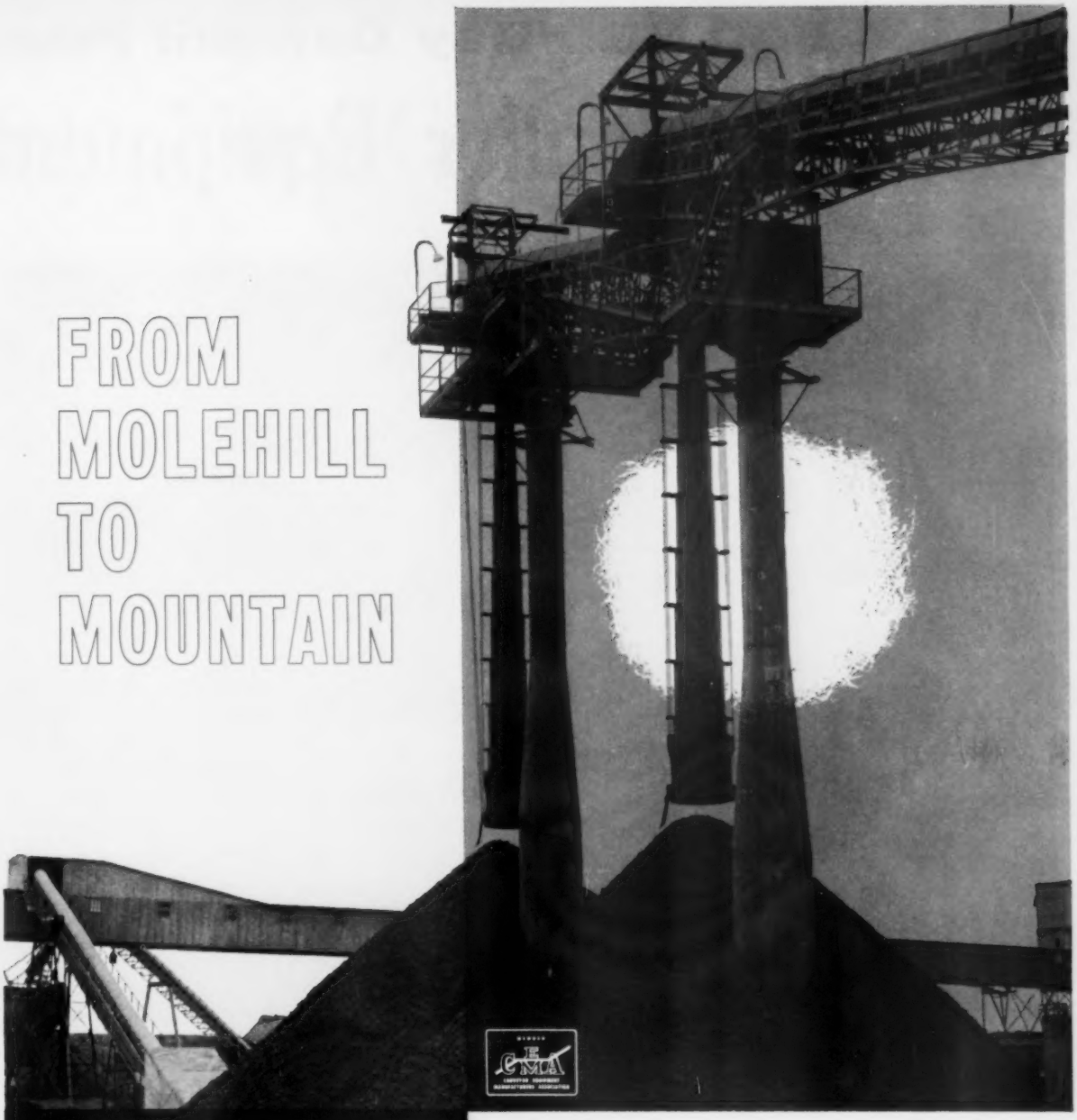
FROM MOLEHILL TO MOUNTAIN



A stack piling operation that grows from a molehill to a mountain. Bulk Systems conveyors move tons of shale daily at the Huron Portland Cement Company's Alpena, Michigan Plant—the worlds largest cement producing facility.

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New 4,000 BBL/Day Cement Plant

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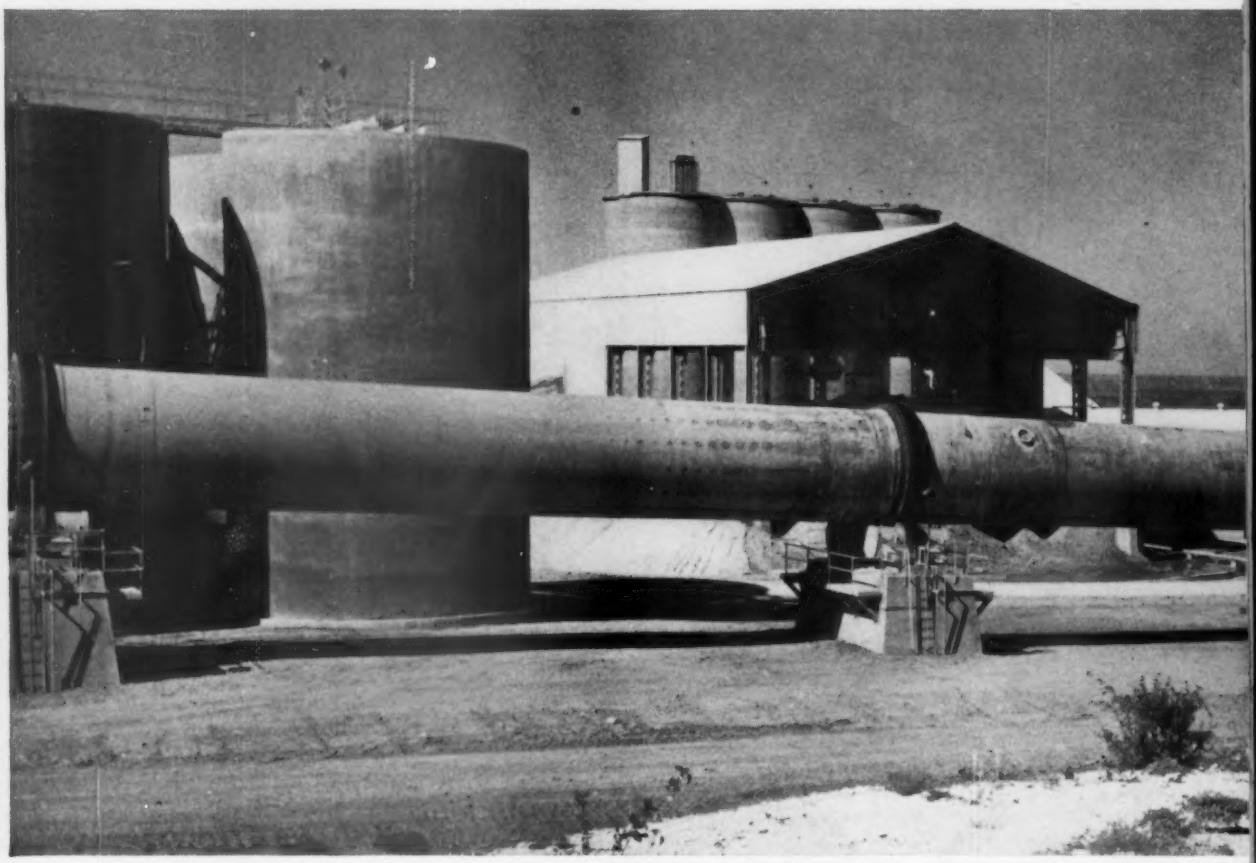

Texas Industries of Dallas Achieves Unusually Low Capital Outlay And Operations Economy By Specifying Quality Equipment

Designing on the basis that true economy in cement plant design considers operation and maintenance costs along with capital outlay, Texas Industries, Inc., with its consulting engineers, selected Fuller equipment for its new cement plant at Midlothian, Texas.

To meet specifications, the following major equipment items were integrated into this modern wet process plant: a Traylor 12 x 450 rotary kiln, a Fuller 8 x 44 horizontal grate cooler, a Traylor 1,500 HP raw mill and a 2,000 HP finish mill, in addition to Dracco multibag dust collectors, Fuller-Kinyon and Airslide fluidizing conveying systems, Fuller rotary compressors, Sutorbilt blowers, Lehigh induced draft fans, Fuller control panels, and auxiliary items.

Unified responsibility provided by Fuller helped to effect simplification of plant design and layout. The result: improved engineering liaison and procurement; significant savings in capital outlay and efficient operation.

Fuller's wide range of major cement plant components provides these advantages for leading cement producers. Behind the quality and systems compatibility of Fuller cement plant equipment is a coordinated research effort. The Fuller Research Department has made significant contributions to the industry. Investigate how Fuller unified responsibility and experience can mean substantial savings in capital costs and increased operational efficiency for you. 4184 G-249T

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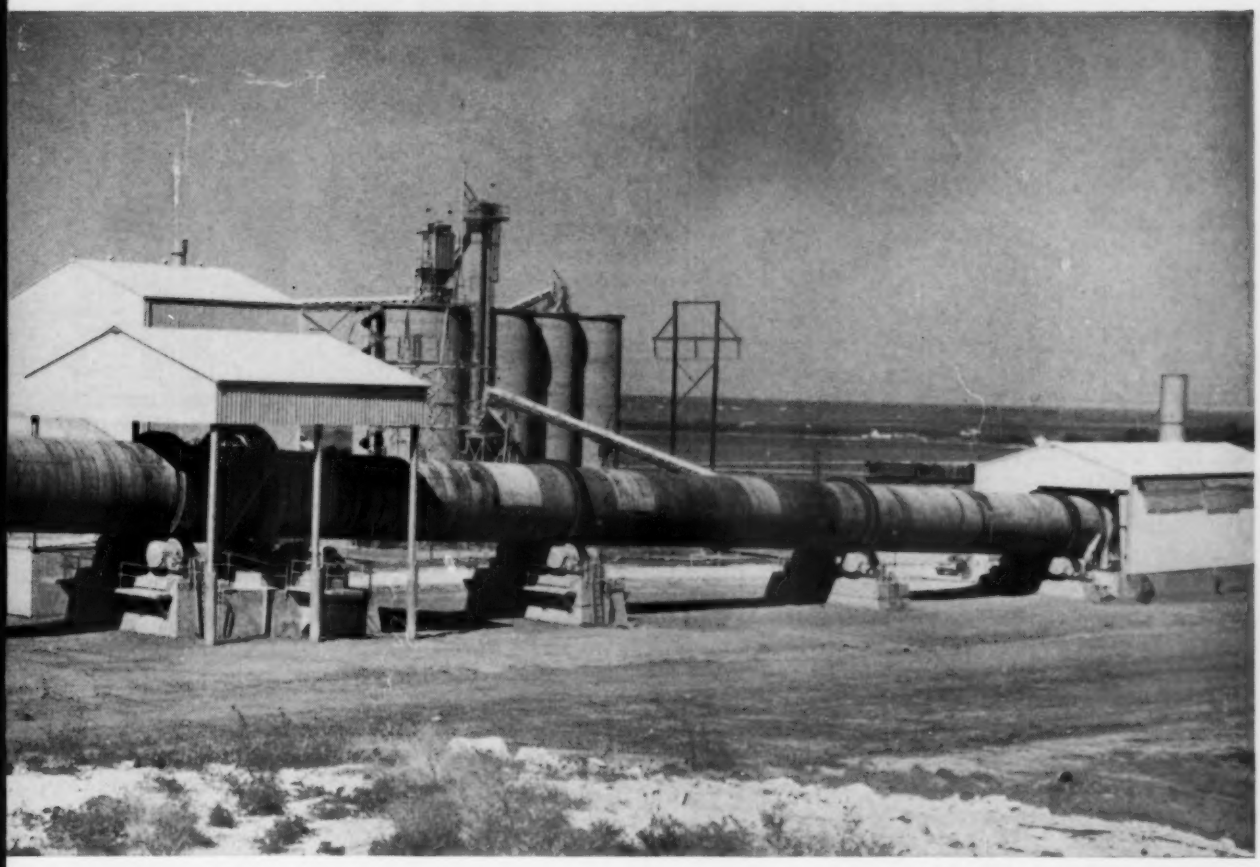

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- Fuller Bin Signals
- Fuller Rotary Valves
- Fuller Rotary Feeders
- Fuller-Kinyon Diverting Valves
- Traylor Two-Compartment Raw Mill, 1,500 HP
- Traylor Two-Compartment Finish Mill, 2,000 HP
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How Do BIG PLANS and BIG PLANTS Work Out?

By W. R. DERSNAH
Technical Superintendent
Dundee Cement Company

ANOTHER P&Q EXCLUSIVE

A progress report of the Dundee Cement Company plant at Dundee, Mich., shows that most of the outstanding objectives reported in PIT AND QUARRY (July, 1960) have been achieved—or even surpassed—in the first year of operation.

How were such results accomplished? Assuming that the design, engineering, and construction are based on sound principles, the achievement depends on people, their ideas, initiative, interest, loyalty, and ambition.

Many of the programs, procedures, and items of equipment of the Dundee Company are new. The execution of these programs with this equipment can be realized at their maximum potential only by an aggressive, well-trained staff, operating through an understanding management able to recognize and properly evaluate the needs of the group, and willing to provide the facilities and freedom of operation found in this company.

The opportunity for such a beginning—with a new company and new plant—occurs all too rarely in the cement industry. The staff was recruited, organized, and trained specifically for the operation of this plant, through the use of the facilities and organization of a sister company.

While the construction of the Dundee plant was taking place, hourly workers from the Dundee area and supervisors from other parts of the country were being trained at Clarkson, Ontario, with the co-operation of the St. Lawrence Cement Company management. In all, a total of 23 hourly workers were trained at Clarkson for periods ranging from a few weeks to almost a year, depending on the complexity of their future position. This training involved the expenditure of thousands of dollars before any return on the investment could be realized. However, the values gained outweighed the cost many times.

To start up the largest new cement plant ever constructed with a staff which included only a few experienced cement people was a monumental task, even with the

View of the IBM room at Dundee with Jim Brandeberry, supervisor, at work on the cards.

Werner Ostberg (third from left), vice-president of operations, discusses IBM reports with I. Jensen, plant superintendent, W. R. Dersnah, technical superintendent, and Doug Shanks, services superintendent and purchasing agent.

Below: Frank Hipp, Graybar Electric Co., takes inventory of his supplies in the storeroom of the Dundee plant.

help of a number of the members of an outside engineering staff. The screening, testing, and training which went into the choice and preparation of the staff paid off, as is shown by the record of accomplishment which has been achieved to date.

How the choice of people has contributed to the present standing of the Dundee plant and how the equipment has been used by the company will be shown in the following pages. Many ideas not included in the original plans have been incorporated, based on suggestions from members of the staff.

Some major and many other minor adjustments and changes in equipment have provided for simplification and uniformity of operation, allowing the operators to reach and surpass the rated capacity of the mill, which was started only about a year ago.

Normal daily operation at the Dundee plant proceeds at the following capacities:

Limestone crushing and handling 500 tons per day.

Clay preparation 2,100 tons per day.

Slurry preparation 240 tons per hour.

Clinker preparation 3,100 tons per day.

DEWEY AND ALMY RESEARCH NOW BRINGS YOU A NEW WAY TO MEASURE MILL RETENTION TIME..

Photo shows new Dewey and Almy portable testing kit designed to measure Mill Retention Time (M.R.T.) in your plant. Test is based on newly-developed Dewey and Almy technique for "tagging" particles with a fluorescent material and identifying them in the grinding mill discharge with a Coleman Fluorometer. Instrument's unique sensitivity detects one part of fluorescein in 100 million parts of cement. Latest development of our Rock Products Chemicals team, this new test technique is another important example of how Dewey and Almy serves the industry's needs through fundamental research in dry dispersion and other related fields.

....(M.R.T.)*

*The time required for an average sized particle of clinker to be produced in one pass through the grinding mill.

By pointing the way to increased grinding efficiency and quality control, a true measure of Mill Retention Time (M.R.T.) can make an important difference in your profit margin. To give you an accurate, on-the-spot check of your M.R.T., Dewey and Almy research has recently perfected the important new "fluorescein tagging" technique detailed at left. With no cost or obligation to you, we'll be glad to send a trained technician from our Rock Products Chemicals team to run this revealing test at your plant. On the basis of the results, he will work with you in suggesting mill adjustments to help you obtain optimum clinker/cement ratio, optimum circulating load and optimum grinding time/hour. He will also suggest proper use of Dewey and Almy dry dispersion grinding aids to help increase air separator efficiency and improve quality through better control of particle size distribution. Your letter or phone call will bring our technical man.

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The uses and values of some of the equipment could be realized only with time; but the record after one years shows that the basic design was good, the equipment was well chosen, the organizational development has proceeded smoothly, and the prospects are promising.

The three major fields with which this progress report is concerned are in detail: (1) The IBM system for production reporting, (2) the maintenance cost system, and (3) the stores inventory system.

IBM SYSTEM FOR PRODUCTION REPORTING

The punch card reporting system is composed of the following:

548 card interpreter, which prints on the cards information which has been punched on the cards.

026 key punch, which punches information on the cards provided from the source documents.

056 verifier, which checks the punched holes.

082 card sorter, which arranges punched cards into designated groups or sequences.

085 collator, which files cards in order for subsequent operations.

602 calculator, which reads punched factors and performs mathematical operations.

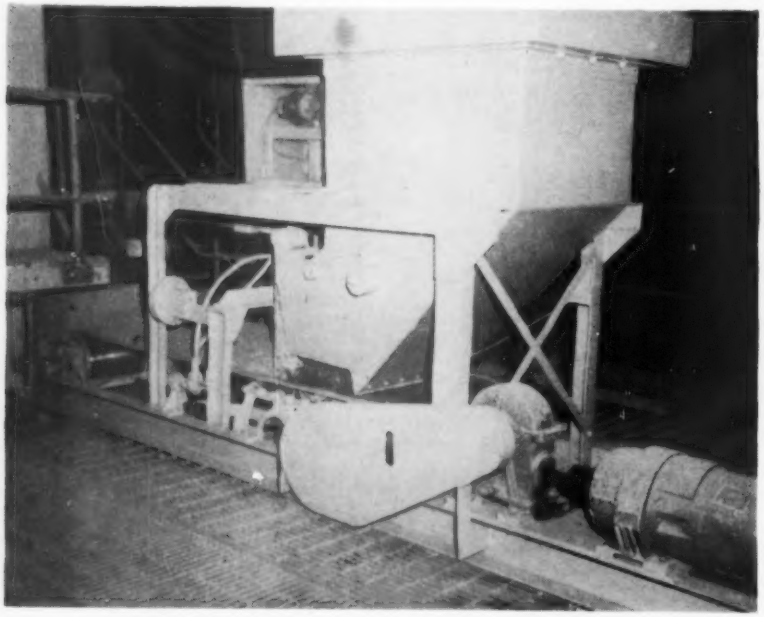
403 tabulator, which prints the information from the cards on the report.

519 reproducer, which is used for reproducing, gang punching, and end printing.

With this group of machines, all the departments of the plant, and particularly the operating department, can get back tabulated and calculated information within time periods when the information can be used to make changes in their operation. The IBM department handles reports for all other departments. Some of the major reports for each department are as follows:

Sales—	Daily trial balance Activity by territory Activity by type of cement Activity by customer Complete department tabulations
Traffic—	Reports to carriers
Stores & Purchasing—	Orders Receipts Issues Inventory
Accounting & Payroll—	Employee time reports Printing of checks Payroll distribution { by department / by labor type / by machine (maintenance) } Exception report { absences / overtime } Accounts payable Journal entries Separate reports for { production / maintenance / construction }
Maintenance—	Hrs. worked by each machine Work order requests
Production—	Production statistics (short) Production statistics (detail) Silo inventory for cement Shipping report

(*Continued on page* 171)



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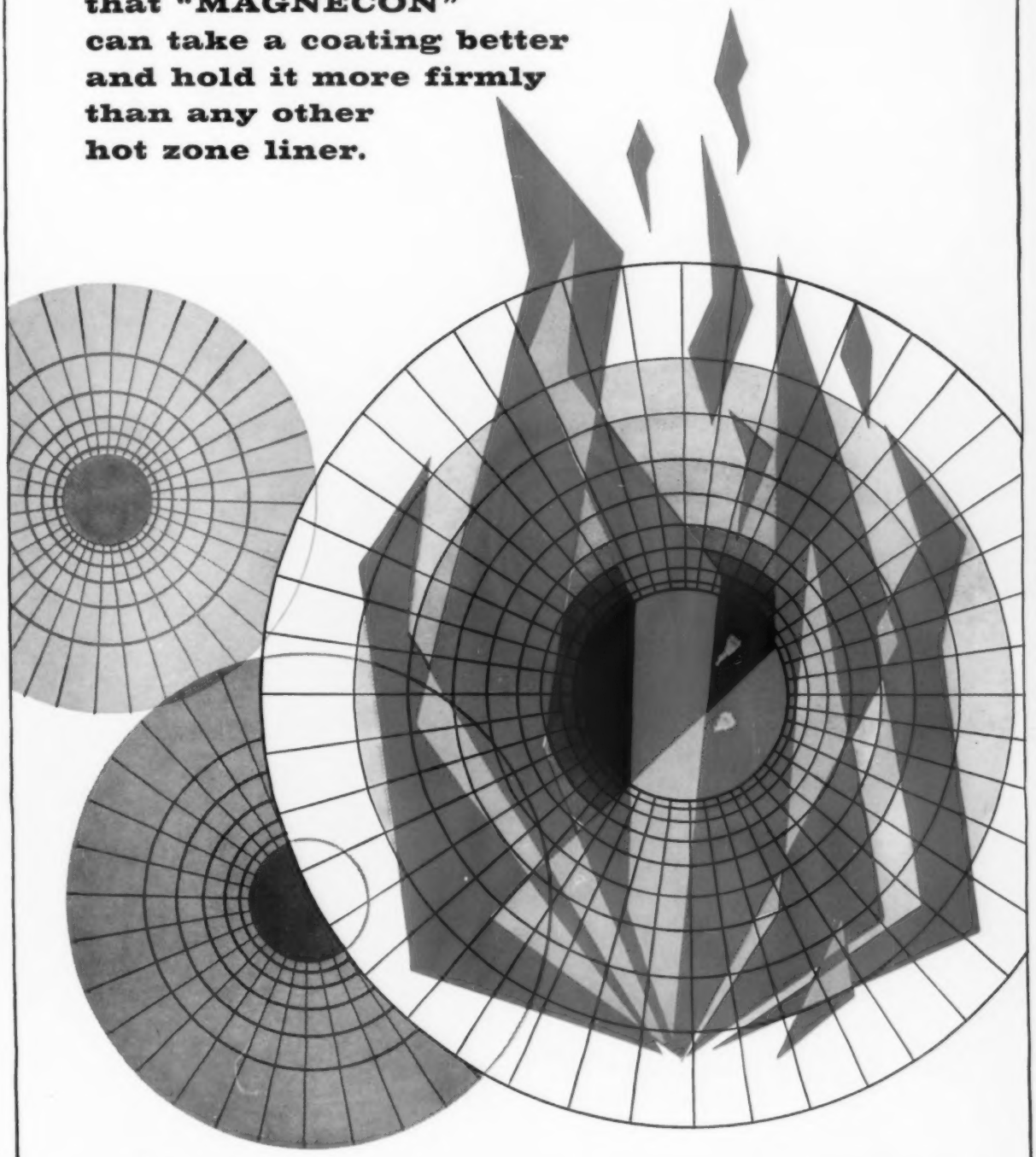

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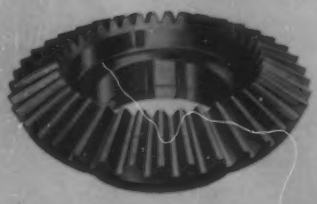

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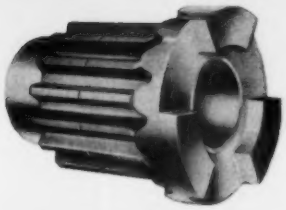
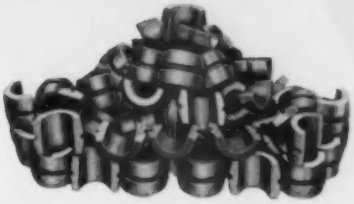
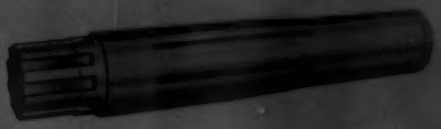


Dragline walking pinion.

Rope drum.



Half bearings.



Rotating shaft.

Drive pinion.

Bevel gears.

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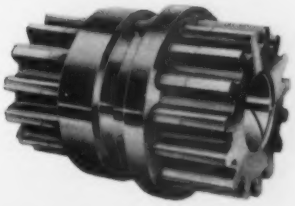
Sheave wheels.

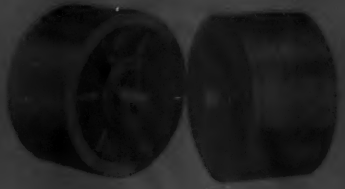
Shipper shaft and pinions.



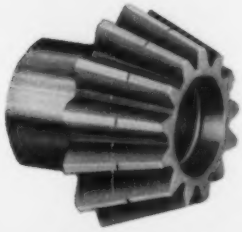
Drive pinions and clutch.

Vertical swing shaft.

Horizontal swing shaft pinion.



Trunnion rolls.

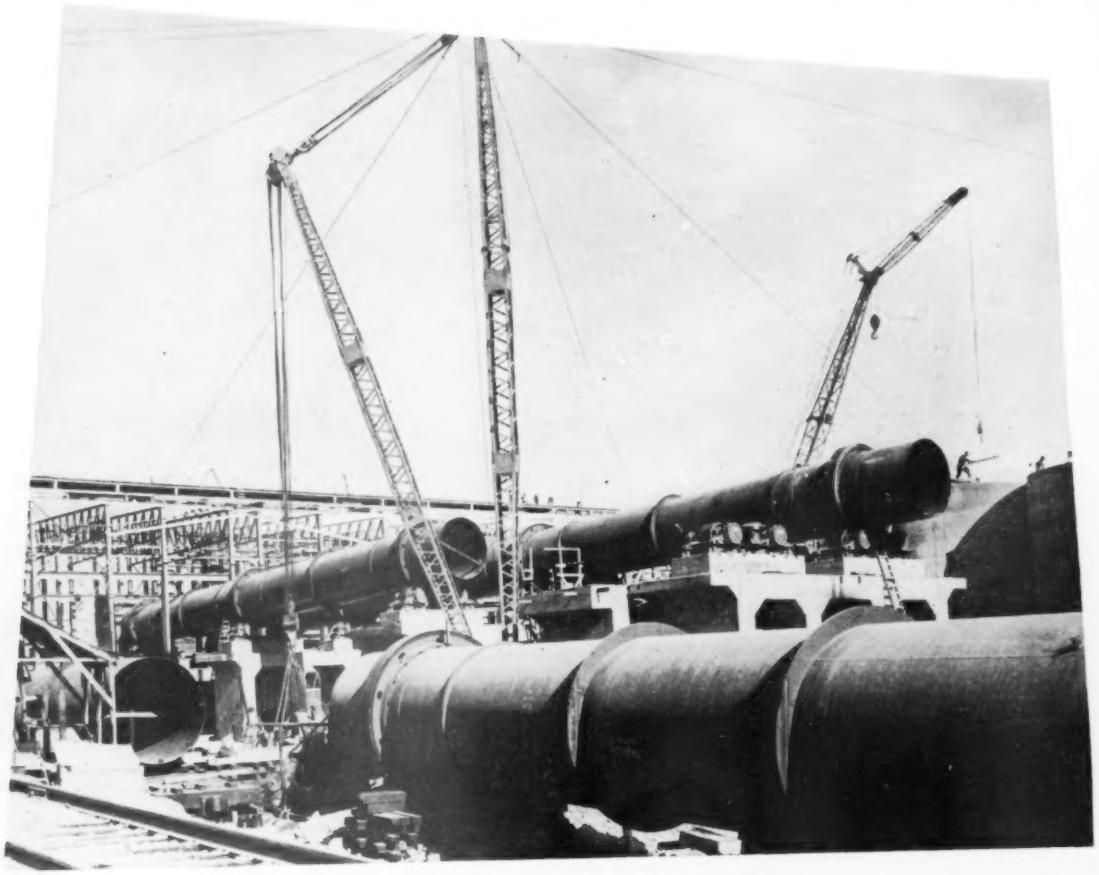


Bevel pinion.

Swing shaft pinion.

Loading machine bevel gear.

. . . BUILDING THESE TAKES *BACKGROUND*



When you build a new plant, enlarge, rebuild, or modernize an existing plant, TAKE IT UP WITH

The Portland cement industry has been served for many years by the complete design and construction facilities of Stearns-Roger. Every step including engineering, fabrication and field erection is handled with the skill of qualified engineers working from long experience.

For a smooth-running cement plant, give the complete assignment to Stearns-Roger.

Stearns-Roger
THE STEARNS-ROGER MFG. CO. • DENVER, COLORADO

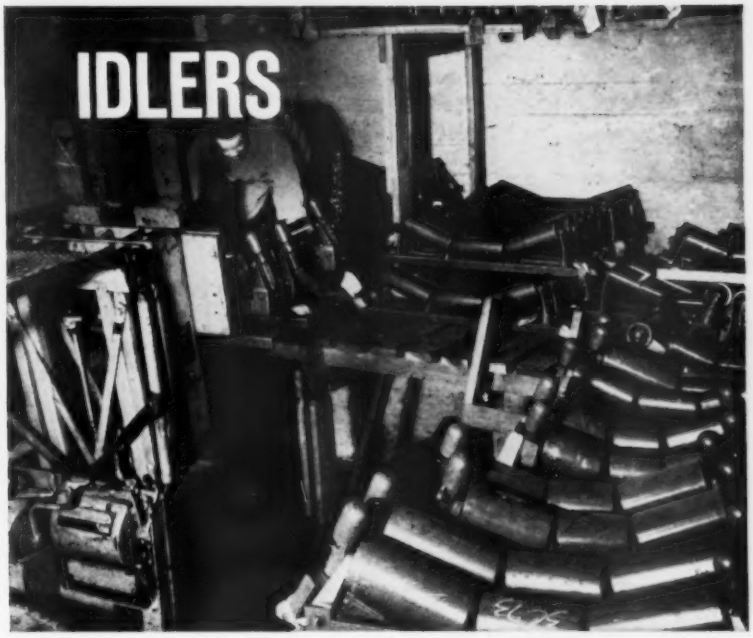
DENVER • HOUSTON
SALT LAKE CITY
STEARNS-ROGER ENGINEERING
COMPANY, LTD., CALGARY

- DESIGN
- ENGINEERING
- FABRICATION
- PROCUREMENT
- CONSTRUCTION

REPLACE WITH

THE BROAD H-R LINE

fast delivery
technical service
local stock



There is an H-R Distributor in your area...

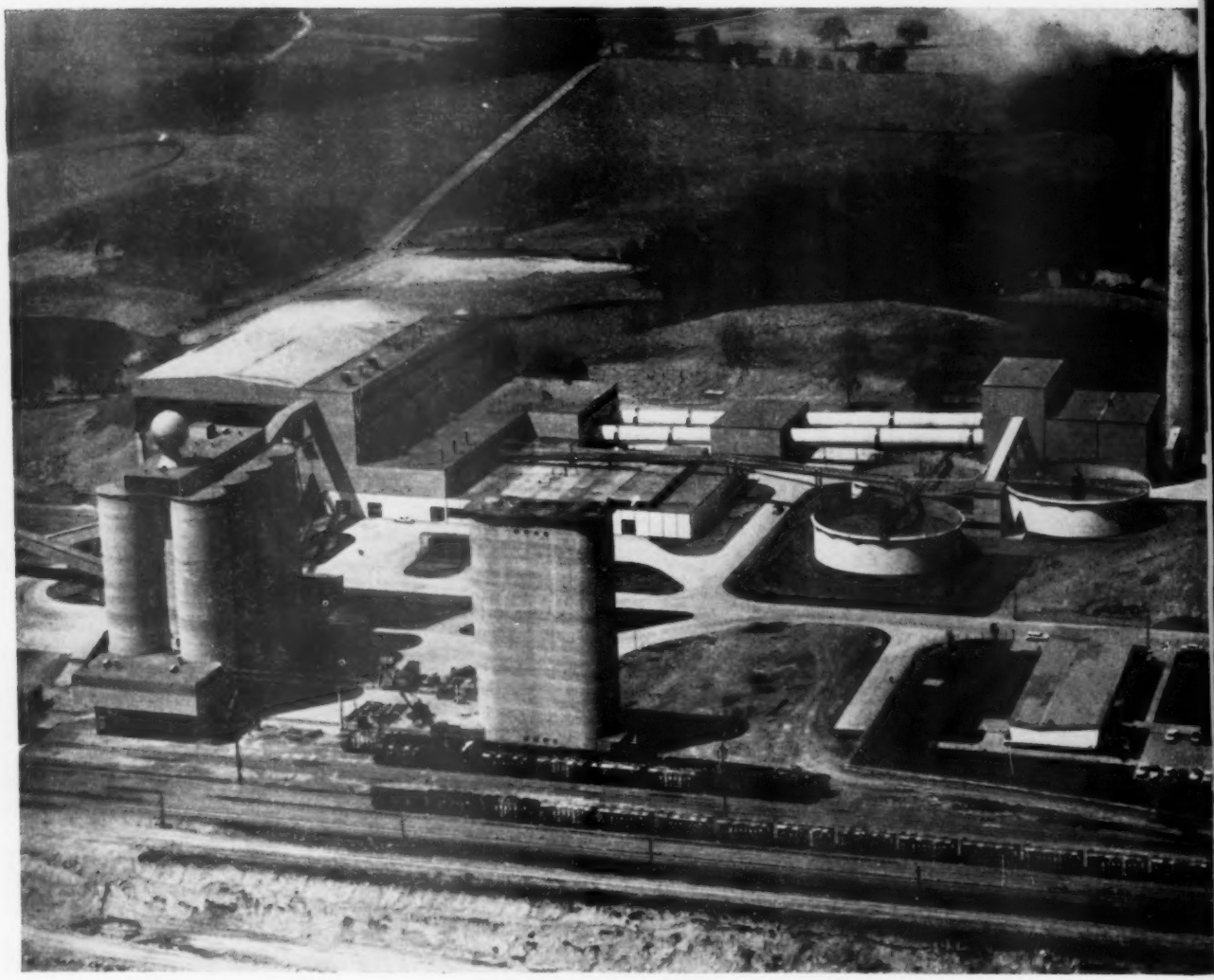
He is part of a stock-carrying distributor network stretching from Coast-to-Coast, backed by Hewitt-Robins warehouses and sales offices. At his fingertips is one of the widest lines of conveyor belt and idlers available in industry. At his command is technical information that could come only from a company that makes *both* components. Hewitt-Robins stands alone as a manufacturer of conveyor machinery *and* conveyor belting. This fact also assures you of highest quality and single-source responsibility. Hewitt-Robins, Stamford, Connecticut.

Write for bulletins
7-24 (Belt)
7-24 (Idlers)

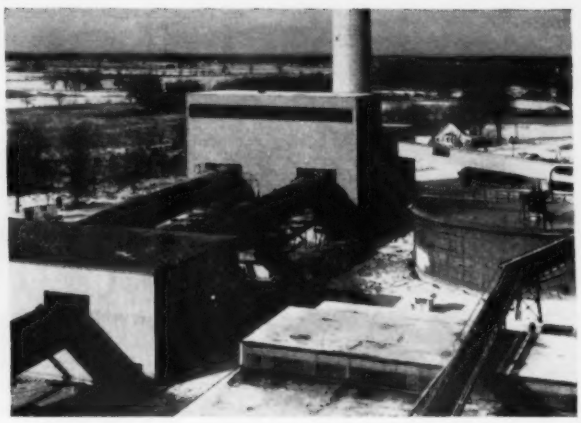
HR HEWITT-ROBINS

Conveyor Machinery and Belting • Power Transmission
Hose • Vibrating Equipment • Engineering Services

DUNDEE CEMENT USES

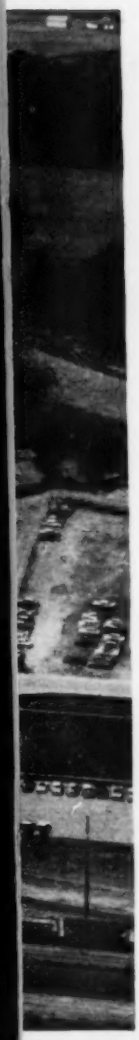


AUTOMATIC LOADING direct from 200,000 bbl. storage silo. Six spouts, fed by reversible belt conveyors, each loads out 300 tons per hour. Three 4-tube bag packers each packs 1,600 bags per hour.



LARGEST IN THE U. S., these F. L. Smidth dumbbell-type kilns are 460' long and largest diameter is 16'6". Texaco Meropa Lubricant and Crater 5X Fluid are used for such demanding applications as girth gears and riding rings.

TEXACO PRODUCTS



New, 6,000,000-barrel Dundee Cement Co. plant —the world's largest built at one time—depends on Texaco for efficiency and maintenance economy

COMPACT DESIGN of Dundee Cement Co. plant near Dundee, Michigan, cuts total traveling distance of raw material from primary crusher to packing plant to only 4,000 feet.

FOUR CONTROL PANELS run entire operation. This panel controls mills. Others control: clay preparation, limestone preparation, and kilns. All equipment—from primary crushers to weighing scales—is 100% Texaco-lubricated.

Huge as it is, the $25,000,000 plant is completely operated by just *four* control panels. What's more—the design permits *doubling* plant capacity without altering any present installations.

Keeping this vast complex of highly automated equipment running efficiently calls for a lubrication program that is simple, complete, and virtually foolproof. Dundee chose Texaco to help them with the job.

With Texaco's Organized Lubrication Plan as a framework, Texaco and Dundee engineers worked out the right lubricants for every piece of equipment.

A Texaco Lubrication Engineer will gladly show you how Texaco's Organized Lubrication Plan can fit into your operation...how it can mean greater efficiency and maintenance economies. Call the nearest of the more than 2,300 Texaco Distributing Plants, or write Texaco Inc., 135 East 42nd Street, New York 17, N.Y.

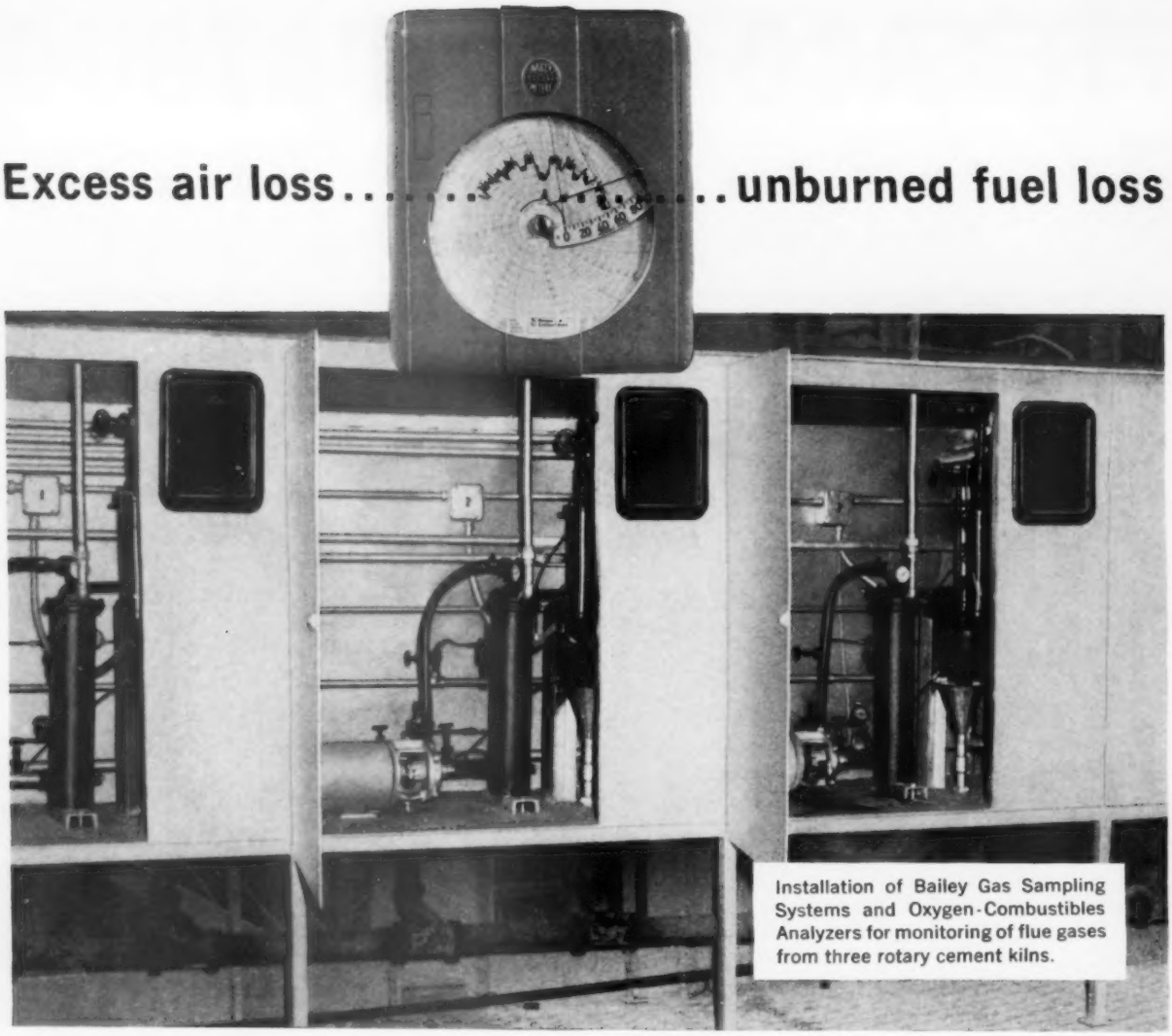
TUNE IN: TEXACO HUNTLEY-BRINKLEY REPORT, MON. THROUGH FRI.—NBC-TV

TEXACO

Throughout the United States

Canada • Latin America • West Africa

Excess air loss.....unburned fuel loss



Installation of Bailey Gas Sampling Systems and Oxygen-Combustibles Analyzers for monitoring of flue gases from three rotary cement kilns.

YOU MUST KNOW BOTH – continuously

...to get best combustion efficiency with a rotary kiln

How much profit is going up the stack every day in unburned fuel? Or are unburned combustibles kept low at the price of heat loss from too much excess air?

Your flue gas tells the story. And the only practical way to know these losses and control them is by continuous analysis of flue gases.

The Bailey Oxygen-Combustibles Analyzer-Recorder performs this monitoring of both unburned fuel and excess air simultaneously and continuously, and records both on a single chart. It permits maximum combustion efficiency to be obtained by maintaining combustion air at the optimum point for each kiln. In addition to effecting savings in fuel costs—more and more important today—accurate control of combustibles helps to prevent ring formations on some kilns. Ask your Bailey engineer, or write, for complete details.

C160-1

CEMENT DIVISION

BAILEY METER COMPANY

1051 IVANHOE ROAD • CLEVELAND 10, OHIO

In Canada—Bailey Meter Company Limited, Montreal

BAILEY METERS

Big Plans and Big Plants

(*Continued from page* 166)

Actually, the machine system was considered necessary for sales and accounting. Operating department reports are produced in what would normally be spare time.

As an example of the daily reports, the production reports will be analyzed. The information from the mill is taken from the daily operator's reports of the departments and transferred to special forms in a period of about 30 minutes at 8 a.m. The data is composed mainly of

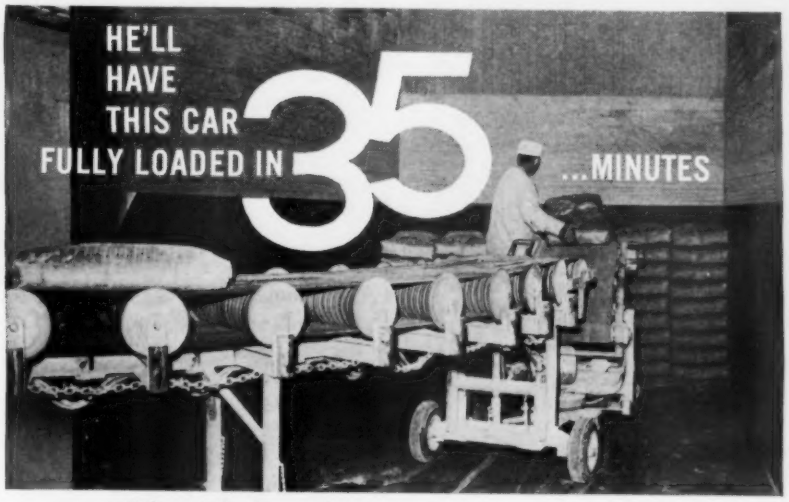
a) hours of operation of equipment
b) tons of materials used
c) tons of materials produced
d) tons of materials shipped
e) tons of materials received
f) power used in each piece of major equipment and department
g) laboratory reports

This information is processed, and the report is returned to the operating supervisor by 3 p.m. of the same day. Calculations have been made to show dry tons of materials used and produced, percentages of components, tons per hour of production, totals shipped, stocks, and power and fuel requirements per ton.

Other figures show chemical percentages, calculation of modules and potential compound composition, and physical properties of cements in totals and averages. Monthly and year-to-date totals reports are also prepared. Short forms showing silo inventory, shipping, and operational items such as power requirements on major machines and major laboratory figures are distributed early in the day to the specified interested staff members and to the operating vice-president. These short forms provide a quick picture and permit a detailed study of the full report at a convenient time.

MAINTENANCE COST SYSTEM

Maintenance costs can be pinpointed in a very short time by the



...without help, using a
POWER-CURVE Loader

Bag loading costs of eight cents a ton are not uncommon in plants using Power-Curve equipment. One man loads and stacks direct from the packer with no need to lift a single bag. Loads can be palletized or stacked in any pattern, also put into warehouse storage.

There are Power-Curve installations near you. Let us show you how your plant can benefit from a custom engineered Power-Curve loading operation.

Literature and engineering details sent on request.

POWER-CURVE
CONVEYOR COMPANY
2185 SOUTH JASON ST., DENVER 23, COLORADO

Enter 171-A on card, page 241

The NATIONAL FILTER MEDIA CORPORATION *PRESENTS*
Formula for Dust Collection

Write for
BULLETIN 14
or
"Formula for Dust Collection"
To either of these addresses

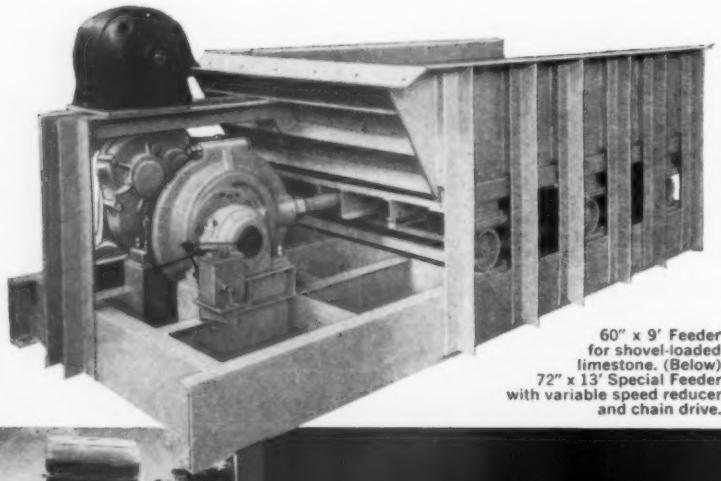
Weavers of Industrial Filter Media for over Fifty Years

THE
NATIONAL FILTER MEDIA CORP.
GENERAL OFFICE and MILLS
NEW HAVEN 14, CONN.
WESTERN OFFICE and Factory
SALT LAKE CITY 10, UTAH

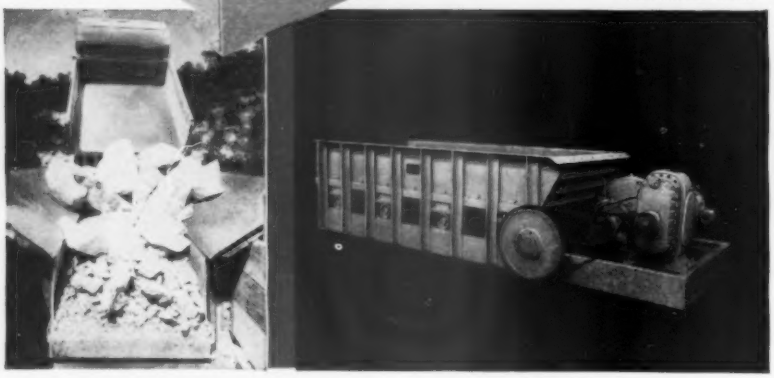
Enter 171-B on card, page 241

LOW COST FEEDING

from sand to shovel-loaded rock



60" x 9' Feeder for shovel-loaded limestone. (Below) 72" x 13' Special Feeder with variable speed reducer and chain drive.



McLANAHAN SINCE 1835

Reciprocating-Plate FEEDERS

Built for lower operating costs and long service, these machines feed uniformly controlled quantities of materials. *The result:* elimination of choke-ups, overloads, wear and tear on the feeder as well as on other plant machinery. *Get the facts from Bulletin FRE-57.*

McLANAHAN Corporation

HOLLIDAYSBURG, PENNSYLVANIA

PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835

Enter 172 on card, page 241

system used for recording and tabulating information.

Each machine is numbered with a department code and a machine code. Spare parts are numbered by the machine code and a parts code.

Control is maintained by the reporting on the time card for each maintenance man his hours worked, by department and machine. The division for men working on more than one machine is in units of four hours or more. It is felt that over a period of time the errors involved in less specific recording will balance themselves.

Spare parts drawn from the storeroom are charged against each department and machine. Comparison of tabulated data of labor and parts makes the charges by department and machine become more and more valuable, for scheduling preventive maintenance and possible alterations or replacement of certain machines.

During the first year, such reporting is mostly the collection of data. However, patterns are beginning to become apparent, and time is on the side of the company in this instance.

Later it is intended to use the IBM system for the programs of lubrication control, preventive maintenance, and maintenance history.

All of these programs will tie in with each other. Even at present the maintenance department records can be used to reveal weaknesses of certain machines, or routines which are required to correct or eliminate these weaknesses. Older methods of depending upon intermediate stockpiles or surge bins are considered inadequate to provide for continuous operation of a plant having a large capacity. Plant management at Dundee has its thumb on maintenance costs, and unscheduled downtime is being eliminated as much as possible.

STORES INVENTORY SYSTEM

The method of keeping stores inventory at the Dundee plant is unusual, to say the least, and it has been reported by some to be unique, at least in the cement industry. Basically, the system works like this: the stores system throughout is divided into expendable materials and spare parts. Eleven local distributors or suppliers of particular expendable items were chosen from a long list of concerns to supply the total con-

sumption of the plant for a six-month contract period. At the end of six months the contract may be renewed at the option of Dundee Cement.

The eleven classifications or groups for these expendable materials are:

Pipe and pipe fittings
Nuts and bolts
Electrical hardware and lighting
Electric and electronic parts
Safety supplies
V-belts and mechanical power transmission components
Bearings
Maintenance steel
Lubricants
Welding supplies
Miscellaneous hardware

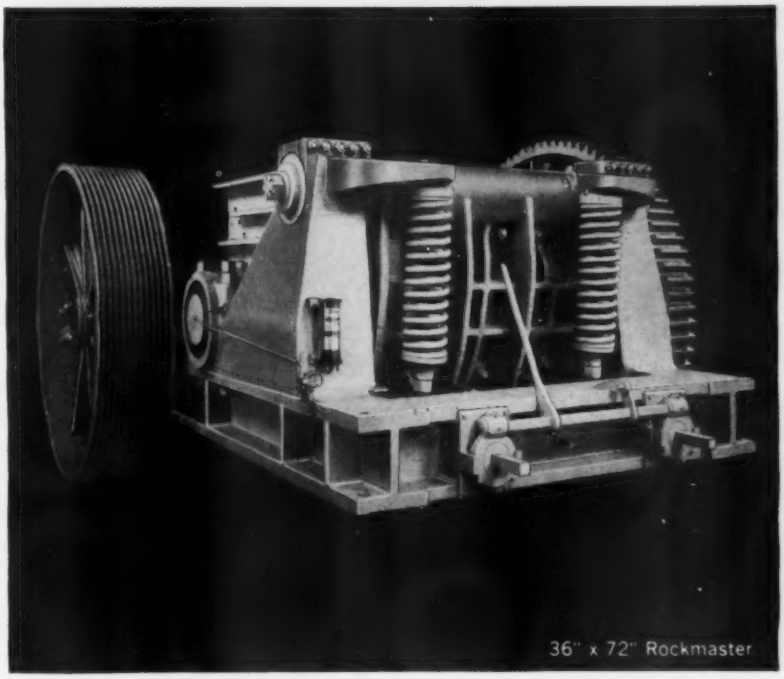
The Dundee Cement Company agrees to purchase all materials in each given group from the one chosen supplier for that group for the six-month period. In return for this, the supplier agrees to assume certain responsibilities. He must regularly check the current inventory of his own parts in the Dundee plant storeroom and must make sure that the company always has an adequate quantity on hand, but not exceeding a six-month supply. He must also keep his own shelves tidy and participate in a periodic general inventory. If parts are found to be in excess, he returns this excess for credit, as long as it is in good shape and in the original containers, to his own supply house.

When the salesman for the supplier calls at the plant, instead of spending time waiting for and talking to the purchasing department, he goes directly to the stores, where he checks his own shelves and prepares a copy of the purchase requisition for materials which are needed. He takes the Dundee descriptions and numbers from IBM cards which are attached to individual racks or bins.

Then, after having the requisition approved by the stores supervisor, this being only a formality, he forwards the requisition to the purchasing department for processing. At the same time the purchase order is being processed, the supplier can assemble the order at his own concern from a duplicate of the

(*Continued on page* 178)

world's MOST POWERFUL
single-roll crushers



36" x 72" Rockmaster

McLANAHAN SINCE 1835 ROCKMASTERS

Widely used for primary and secondary crushing on the hardest and toughest kinds of shovel-loaded rock and ore, Rockmasters have high capacities and extraordinary ratios of reduction. Also they are the world's finest crushers for wet and sticky feed. Among outstanding design features: Automatic Steelstrut Toggle for release of tramp iron, and Quick-Adjustment for controlling size range.

Get all the facts from Bulletin RMTD-56.

McLANAHAN Corporation
HOLLIDAYSBURG, PENNSYLVANIA
PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835

Enter 173 on card, page 241

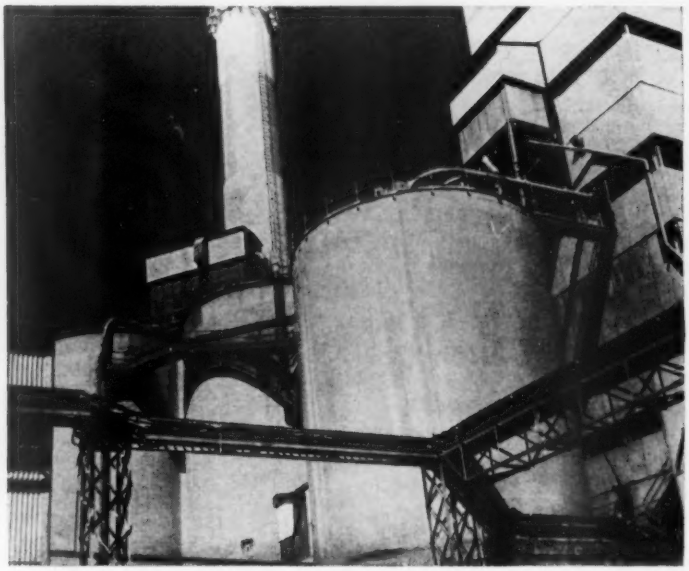
New Rail and Truck Loading Station for North American Cement Corp., Catskill, New York.

CUSTOMER SILOS

NICHOLSON again calls your attention to the trend in Distribution Stations.

NICHOLSON has just concluded contracts for four (4) additional bulk loading stations to be built for owners specific needs.

NICHOLSON is ready to build to your specifications to increase your shipping facilities.



New Homogenizing Silos—Medusa Portland Cement Co., Dixon, Illinois.

PLANT EXPANSION

NICHOLSON has just completed an extensive plant expansion program for Medusa Portland Cement Company at Dixon, Illinois.

Picture to the right illustrates the new homogenizing silos and a complete new system installed under bins to increase production.

NICHOLSON built these expanded facilities under an extremely tight schedule during uninterrupted plant operations.

Some clients recently served:

Alpha Portland Cement Company
Dundee Cement Company
St. Lawrence Cement Company
North American Cement Company
Peerless Cement Company
Medusa Portland Cement Company
Allentown Portland Cement Company
Penn-Dixie Cement Corporation

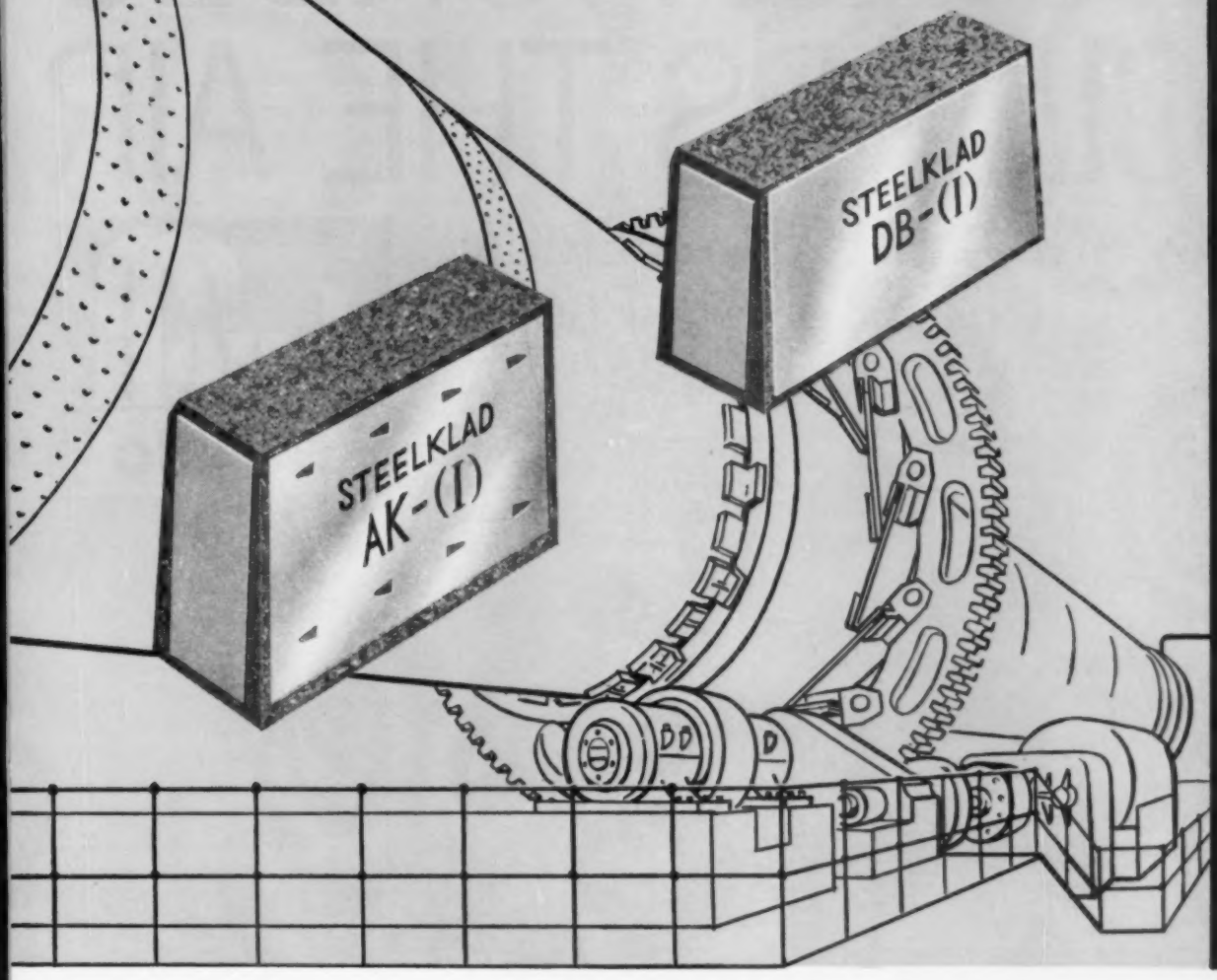
BULK STORAGE ENGINEERING HANDLING EQUIPMENT
THE NICHOLSON CO.
CONSTRUCTION

ENGINEERS AND CONTRACTORS

New Kiln, & feed end building, part of enlarged plant built by Nicholson for Medusa Portland Cement Co., Dixon, Ill., plant.

10 ROCKEFELLER PLAZA **NEW YORK 20, N. Y.**

Two New Grefco Basic Kiln Liners



GENERAL REFRACTORIES

Maximum Service For Extreme Conditions

One or the other will do it—STEELKLAD-AK-(I) and STEELKLAD-DB-(I) are the results of watching and analyzing rotary kiln conditions all over the world. Every known extreme in burning zone conditions can be met with one or the other brick. And they're beveled for the easiest installation yet!

No two kilns impose identical demands on a refractory. Save time and money by taking advantage of Grefco's engineering service; use it to select the brick most suited to youf conditions.

NEW STEELKLAD AK-(I) Low cost chemically bonded magnesite brick, with *integral* steel plates and attached expansion strips.

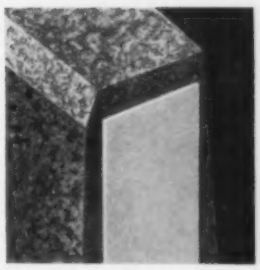
- Best attainable spall resistance
- Lowest thermal conductivity
- Excellent coating characteristics

NEW STEELKLAD DB-(I) *Burned* Magnesite Brick, ceramically bonded for great strength; shipped with steel plates and cardboard expansion strips attached.

- Maximum spall resistance in a burned brick
- Minimum loss of protective coating from intermittent operation
- Stubbornly resistant to destructive kiln atmospheres

NOTE THE BEVEL!
New STEELKLAD DB-(I) and STEELKLAD AK-(I) are the only rotary kiln bricks with a bevel. Results?

TIGHTEST POSSIBLE LININGS . . . the bevel makes it possible to drive any required additional shims or plates easily and rapidly for tightly keying individual rings.



HOT FACE IDENTIFICATION . . . positive and quick.

A Complete Refractories Service

Write for further information!

GENERAL REFRACTORIES COMPANY

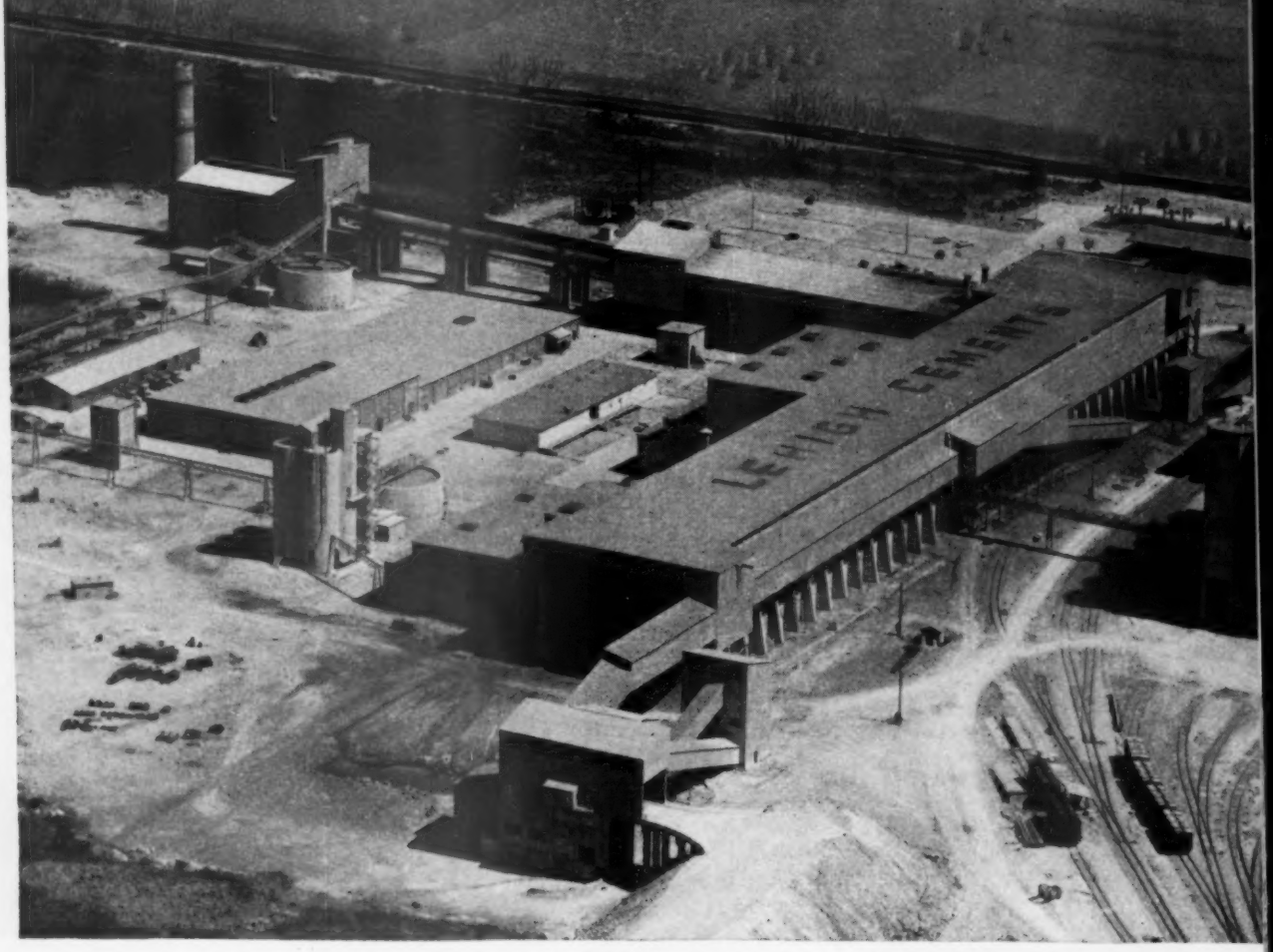
General Offices: 1520 Locust St.
Philadelphia 2, Pennsylvania

District Sales Offices
In all principal cities

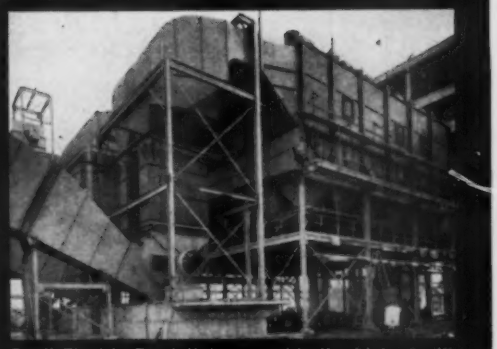
BUELL-NORBLO CLEARS THE AIR

IN AND AROUND AMERICA'S LEADING CEMENT PLANTS

buell
Norblo®

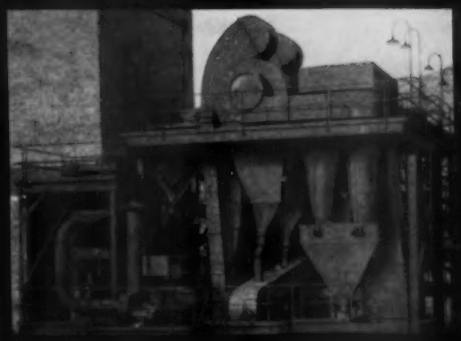


For dust control and the elimination of air pollution, Buell-Norblo equipment is "first choice" in the cement industry. And for good reasons, too. No one can match our years of experience in this field, with continued high operating efficiency and low maintenance recorded by Buell-Norblo equipment in hundreds of installations. We'll be glad to work with you on improving your existing dust control systems as well as new plant construction. Field service engineers are qualified to help you design, lay out and select the proper type of equipment for each application. There's no obligation. Why not contact us for a complete study on how best to clear the air in and around your plant? Buell Engineering Company, Inc., 123 William Street, New York 38, New York. Northern Blower Division, 6409 Barberton Avenue, Cleveland, Ohio. (Subsidiary: Ambuco Limited, London, England).
▪ Cyclones ▪ Electric Precipitators ▪ Bag Collectors ▪ Combination Systems ▪ Fans ▪ Classifiers

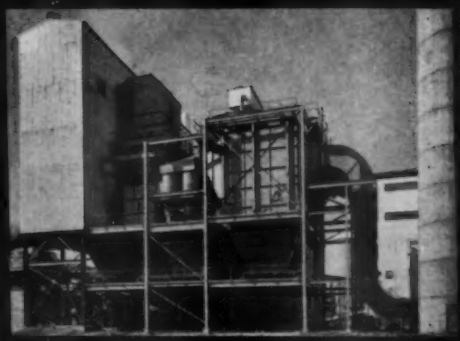


Buell Electric Precipitators provide the highest efficiency in cleaning gas from cement kilns and thereby preventing air pollution.

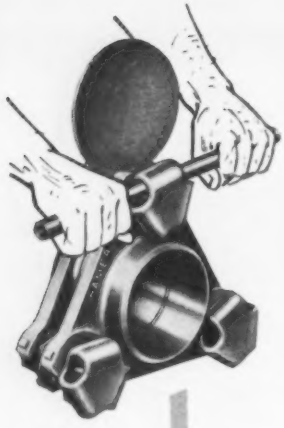
Norblo Bag Type Dust Arresters on grinding mills, clinker handling, pack-house and crushing operations keep plant areas clean.
Norblo air-cooling systems in the milling process provide cooler, more efficient grinding and lowered temperature of fines ready for storage.



Buell Classifying Systems perform separating operations in size classification of all types of materials. They have the capacity to keep up with any milling operations.



Buell Cyclones alone or in combination with Buell precipitators can recover valuable materials as well as provide high efficiency dust control.



FAST... POSITIVE... EASY... VISIBLE*

line blinding with
Hamer 3-Bolt
Line Blind Valves

Spool shaped nuts and bolts spread flanges when turned to the LEFT with bar.

Spectacle plate is reversed by lifting slightly and revolving in either direction.

Flanges are tightened by turning bolts to RIGHT.

FAST, because in a minute or two the spectacle plate is reversed from open to closed position. POSITIVE, because you have a solid plate seal. EASY, because the flanges are spread by backing-off three bolts with a bar. VISIBLE*, because you can see from a distance which blinds are open and which closed.

With HAMER Line Blind Valves on your silo loading lines, there is no danger of contamination . . . no costly multi-man operation to blind the lines . . . no possibility of the valves wedging, sticking or jamming. There is practically no maintenance required and they are unsurpassed for easy operation, long life and resistance to abrasion.

Ask your HAMER Valve Specialist for information or write direct for latest catalog.

WELL EQUIPMENT MFG. CORP. HV-5-61
P. O. BOX 19465 • HOUSTON 24, TEXAS
Division of CHIKSAN COMPANY a subsidiary of FOOD MACHINERY AND CHEMICAL CORPORATION

Enter 178 on card, page 241

Big Plans and Big Plants

(*Continued from page 173*)

purchase requisition which he has made. As soon as the purchase order is received, the order can be delivered.

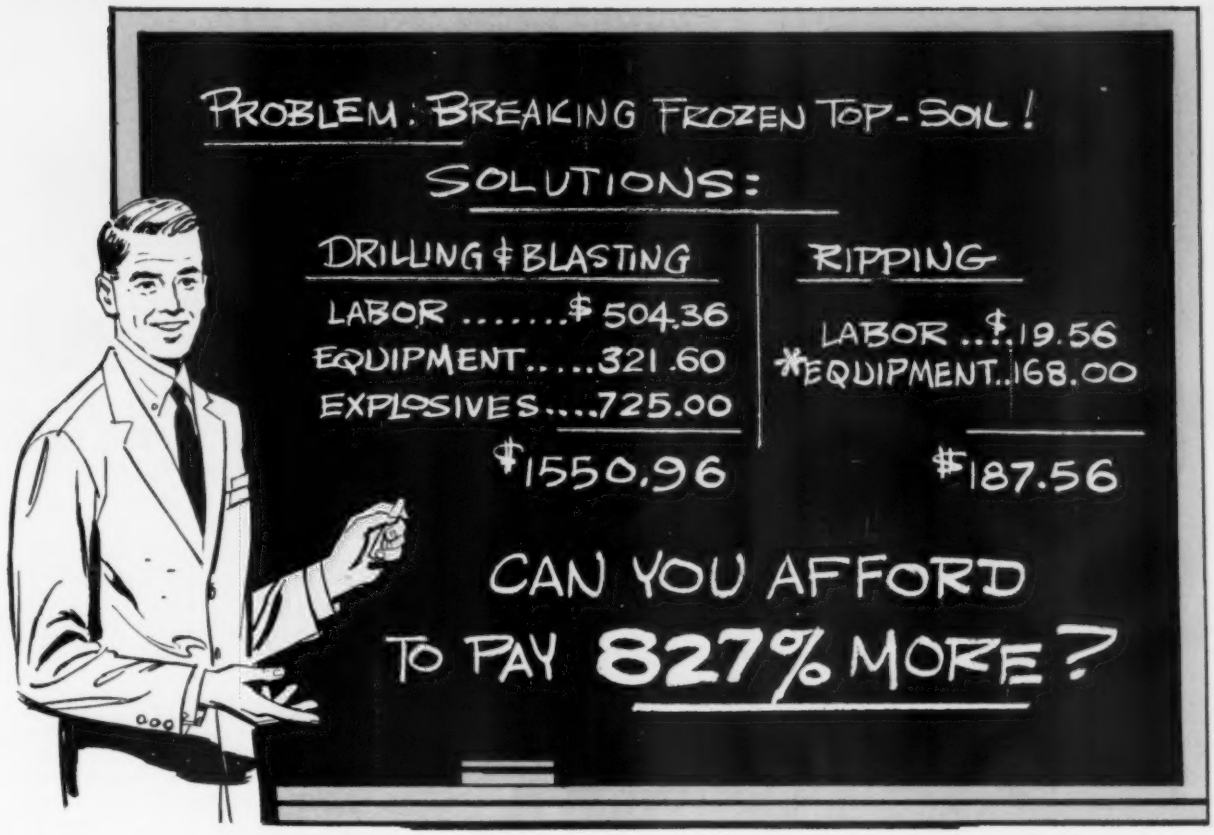
The stores system in Dundee is operated throughout on the honor system. The supplier stocks the shelves at his own discretion as far as amount is concerned, but with advice of plant people on type. The stock is recorded on IBM cards, and a majority of the items are located in a self-serve area which is open to the workers in the plant.

On removing items from this area, the person taking the item marks the quantity down on an IBM card from a supply of cards in each rack or bin and deposits it in a special rack. These IBM cards are processed regularly, so that a report is available at all times to show the amount in stock for any item. Suppliers are encouraged by their freedom of placing materials on the shelves not to let their own shelves become overstocked with items which may later have to be returned for credit.

Throughout the whole system the mutual advantage realized is to save time and manpower. The stores are operated by two persons. All spare parts have cards with machine and part numbers pre-punched. When a spare part is withdrawn from stock, the card is marked with the department number and the units withdrawn. All spare part reports have maximum and minimum stocks. When the minimum is reached, the report indicates that a reorder is required.

The purchasing department concentrates on production materials, direct purchases, and unusual or slow-moving items, not taking regular time out to talk to salesmen of suppliers of the expendable items. The maintenance staff does not have to spend time waiting for stores attendants to locate items in the self-serve area for them. The book work in both the purchasing and accounting departments is kept to the minimum. Suppliers of expendables bill the company monthly, regardless of how many times the salesman calls or how many times his stock is replenished during the month.

The maintenance and repair parts



*EQUIPMENT

A Cat D9 Tractor with extra heavy-duty Kelley Ripper — breaks solid rock, frozen materials, coal into easily handled pieces at a cost that's 15 to 85% less than drilling-blasting . . . massive hydraulic cylinders keep 3½" thick shank at any desired depth to 84".

Data from actual job report where both solutions were used in the same materials, same area. Location of this and other money-saving applications of the Kelley Ripper can be obtained at your Caterpillar Dealer.

Kelley Rippers are sold only by your Caterpillar Dealer

KELLEY RIPPER C R C

A division of
Crutcher-Rolfs-Cummings, Inc.
Houston, Texas

Caterpillar, Cat and Tractoveter are Registered Trademarks of Caterpillar Tractor Co.

5716

"THIS LUBRICANT CUT BEARING REPLACEMENTS OVER 40%"

says—HANOVER BUILDING SUPPLY CO. of Hanover, Pa.

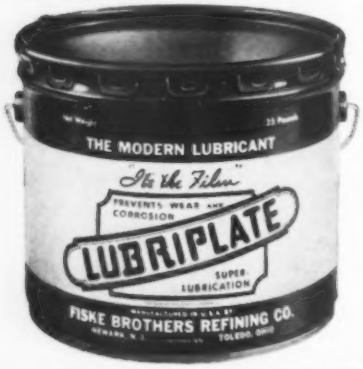
"Before using LUBRIPLATE, we replaced the wheel bearings in over 50% of our trucks each year. Since using it, bearing replacements have dropped to less than 10%. We have also been able to increase periods between chassis lubrications from 500 to 2000 miles. We are very happy over our change to LUBRIPLATE, and heartily recommend it to fleet operators interested in saving money."

HANOVER BUILDING SUPPLY CO.
C. O. Albright, Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



Enter 180-A on card, page 241

inventory at Dundee is in the neighborhood of $400,000, much of it in large and long-delivery-time items. The sales volume in the expendable groups is about $1,000 to $3,000 monthly. In spite of these tremendous values, the honor system for both suppliers and plant personnel works to the extent that overstocking and pilferage is considered insignificant. The main purpose of the system of providing adequate stocks with the minimum of effort on the part of the staff is working to the satisfaction of all concerned.

Indicative of the continuing toll-road activity in the United States was the sale of bonds totalling $175 million in April for financing an 11.7-mile extension of the Massachusetts turnpike. Other states in which tollroads are planned are Delaware, Florida, Kentucky, Oklahoma, and Virginia.

A 34-acre tract on the Missouri River in North Omaha, Nebr., is the site for a cement storage and shipping terminal to be built for the Missouri Portland Cement Company. Cement will be shipped up the river by barge from the firm's Kansas City plant.

In reporting on the first six months of Oklahoma Cement Company's operation, Cloyce K. Box, president, stated that sales amounted to 339,729 bbl., which sold for $1,058,145. Although the first quarter was slow, the new plant at Pryor, Okla., operated at 107 percent of rated capacity, justifying a favorable outlook.

According to Melvin H. Baker, chairman of the board, National Gypsum Company, this firm plans to acquire more cement companies in order to expand its market coverage. Huron Portland Cement Company was purchased in 1959 and Allentown Portland Cement Company last year. No time schedule was given for future acquisitions.

LEAKING SHUT-OFF DAMPERS A PROBLEM IN YOUR PLANT?

Well, they needn't be any longer!

The new SF Shut-Off Damper for dust laden gases has been engineered to meet the most exacting requirements for a LEAK-PROOF damper device.

It has been tested over long periods under the most unfavorable operating conditions, with hot, moist flue gases containing fine dust particles — factors which often lead to the formation of deposits. And even under these conditions, the operating and sealing characteristics of the SF Damper have proved themselves superior! Therefore, in installations where you depend on leak proof shut-off dampers to minimize costly shut down time, you can now cut down on your maintenance costs. And, better still, you will be back in full production much sooner!

With the existing design of the SF Shut-Off Damper, it can be readily installed in various systems of flue gas ducts. It is available in 12 standard sizes, capable of handling gas or air quantities ranging from 6,000 to 250,000 cubic feet per minute. It may be manually operated or supplied with an automatic device for remote control.

★
AMERICAN SF PRODUCTS, INC.
701 Palisade Avenue, Englewood Cliffs, N. J.

SF Products Canada Ltd.,
940 Cote de Liesse Road, Montreal

Enter 180-B on card, page 241

HIGH SPEED CONVEYING OF BULK MATERIALS

SYNTRON

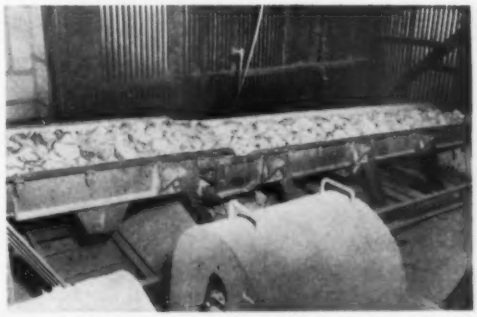
MECHANICAL VIBRATING CONVEYORS

SAVE BULK MATERIALS HANDLING COSTS

Many industries through the nation are recording big monthly savings in operating and maintenance costs by using Syntron Mechanical Vibrating Conveyors.

Designed to handle most bulk materials efficiently at high ton per hour rates—sand, sinter, castings, hot or cold—constructed to withstand the wear and abuse of foundry operation, built for long dependable service with a minimum of maintenance.

Syntron has a full line of types and size for every job. Investigate the possibilities of Syntron Conveyors in your operation.



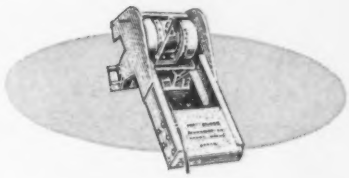
Vibrating Conveyors — handle fines, granules, or chunks — damp or dry, hot or cold — provide a constant, high speed flow of materials.

Write for a Syntron Catalog today

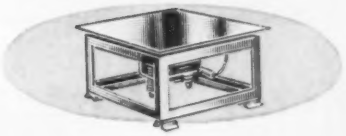
61VC1

Other SYNTRON equipment of proven dependable quality

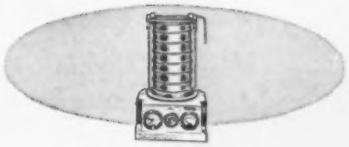
Rectifier Power Units



Car Shakers



Packer & Jolters



Test Sieve Shakers

Gravimetric Feeders

SYNTRON

SYNTRON COMPANY

385 Carson Avenue • Homer City, Pa.

Providing more bail pull, maximum dipper fill factor, low per-ton loading cost—Magnetorque Hoist Drive on 17-year-old P&H 1400 refuses to show its age.

After 17 years, first Magnetorque equipped

... at MISSOURI PORTLAND CEMENT CO.

Virgil Wendt, Quarry Supt., reports—

"Back in 1944, we bought the first P&H ever sold with Magnetorque; today this 1400 still gives us good, reliable service. If our plant needs extra limestone, we think nothing of working this shovel for 16 hours at a stretch. We still rely on it to do the job for us. Teamed with the P&H 1500 we bought in 1958, it gives us as efficient a digging operation as you'll find anywhere."

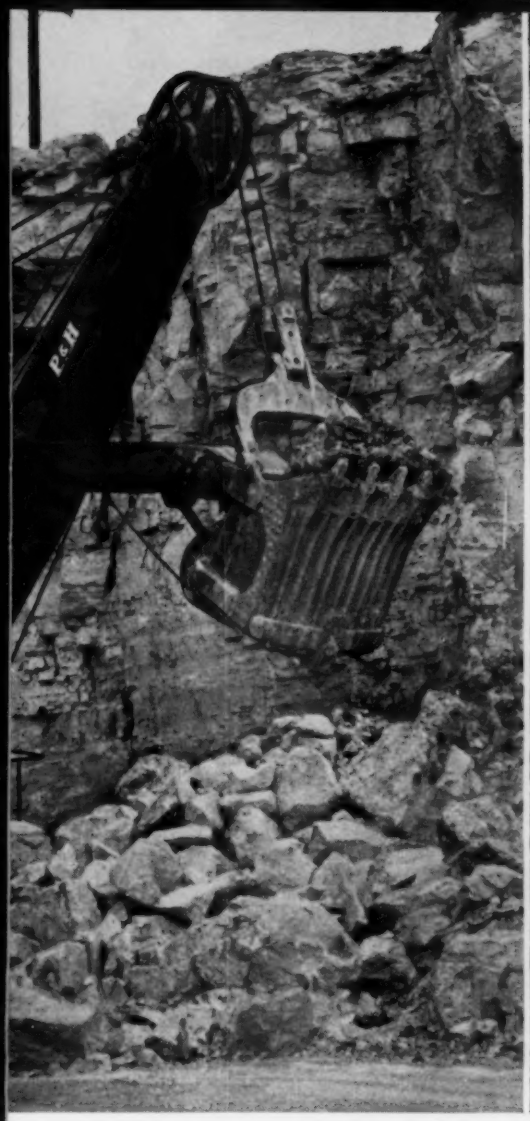
Two P&H Electrics Load 1,123,000 Tons Annually

To meet quarry production schedules, Missouri Portland's modern, five-million barrel cement plant demands absolutely dependable equipment. Two types of rock must be dug daily to supply the right "mix." To accomplish this, the two P&H Electric Shovels work at different levels along an 1835 foot long quarry face.

Equipped with a 4-yard dipper, the P&H 1400 has seen years of hard, workhorse service. One year it loaded over 750,000 tons. Now it digs at the base of the quarry's upper face, loading up to 360 tons of limestone an hour. The newer, 5-yard P&H 1500 digs at the base of the lower face, loading up to 400 tons of limestone an hour without hesitation.

Magnetorque Helps Maintain High Production

Exclusive Magnetorque Hoist Drive on these P&H machines is the key to their greater productivity. It gives more digging bail pull—puts more material in the dipper faster, with every pass. Mr. Henry Merz,



20-ton capacity trucks are loaded at the rate of about 15 loads per hour. P&H 1400 with 4-yard dipper shows it's still a workhorse.

Quick, accurate dipper spotting results from responsive electronic controls on 5-yard P&H 1500. Loads 18 to 20, 20-ton trucks per hour.

P&H electric is still going strong

Fort Bellefontaine Quarry in St. Louis County

Quarry Foreman, says—"The electronic controls on our P&H shovels are very responsive and the Magnetorque hoist drive is especially powerful."

Superior P&H Parts And Service Is Worth A Lot

Mr. Virgil Wendt has this comment to make—"I think one big reason the 1400 is still going strong is that P&H really stands behind its equipment with immediate help, should it be necessary. This is worth a lot. Harnischfeger not only builds a good shovel, but helps keep it working right."

Summary Report On 17 Year Old P&H 1400

Here is how Mr. H. Clay Iten, Plant Manager, puts it—"We have no plans to replace our P&H 1400 after all these years. It's always done a good job for us; it's doing a good job for us now, and we expect it will continue to do so."

Compare all performance factors before you buy—for more detailed information on this operation, write for Case History Report No. 141 to the World's Largest Builder of Full-Electric Shovels.

HARNISCHFEGER **P&H**

Milwaukee 46, Wisconsin

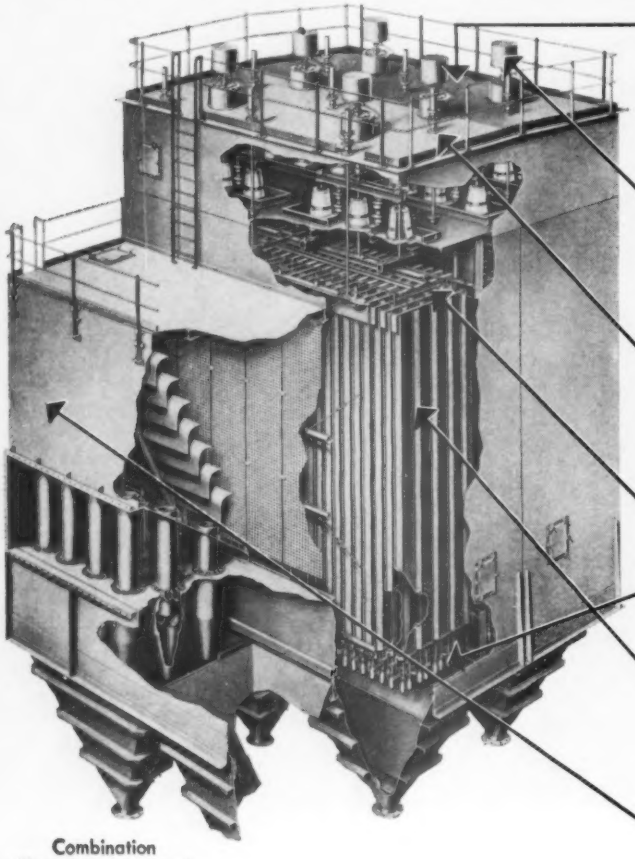
CONSTRUCTION & MINING DIVISION

61-899

Enter 182 on card, page 241

Research-Cottrell Dust Collectors

As the world's largest manufacturer of electrostatic precipitators, Research-Cottrell is well known in the cement industry. Whether your dust collecting problem requires a straight precipitator, a mechanical collector or a combination unit, you can count on an economical solution from Research-Cottrell.



Combination Electrical-Mechanical Collector

New Top Constructions — Insulator compartments or steel housing over the entire roof are available. Designed for low insulator maintenance; bushings can be replaced without disturbing high tension frame. Top housing provides "out-of-weather" working space for maintenance.

New Discharge Electrode Rappers— Available in air, electric or impact type. Cycle and intensity are easily adjusted to maintain highest collection efficiency.

Plate Rappers on Roof—New arrangement provides better rapping and easier access to automatically controlled rappers, without additional expensive platforms.

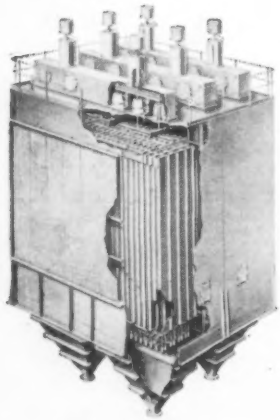
New Discharge Electrodes — Discharge electrodes are individually hung for easier access from top to bottom. Entire collecting plate surface is effective because the discharge wires extend well beyond the top and bottom of the plate.

Opzel Collecting Electrodes — New design cuts cost, provides optimum precipitation zone with better gas flow and electrical conditions.

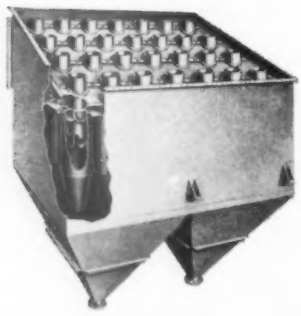
New Cyclo-trell — Sets new standards for collection efficiency and gas volume capacity. Arrangement improves gas distribution to precipitator. Collector is of rugged construction.

Cottrell Automation System — Higher "around-the-clock" collection efficiency, without manual adjustments. New electronic methods provide continuous optimum energization.

Silicon Rectifiers — New, hermetically sealed rectifiers last as long as the precipitator — without maintenance. Rectification efficiency is 96% to 99% with no voltage drop due to age.



Cottrell Precipitator



Cyclo-trell Mechanical Collector (available with 10"or 24" tubes)

For complete information on any dust collecting or gas cleaning problems, contact your nearest Research-Cottrell office.

Research-Cottrell

RESEARCH-COTTRELL, INC., Main Office and Plant: Bound Brook, N. J.
Representatives in principal cities of U.S. and Canada.

RC229

MEMBER OF THE INDUSTRIAL GAS CLEANING INSTITUTE

Template shows how these Ni-Hard single-wave liner plates still retain their contour after 30 months of grinding. Mill was lined with 7 materials for test — two rows apiece. Pretoria Portland Cement Co. now specifies Ni-Hard liners for dry-mill service.

Template shows how

NI-HARD liners out-perform all others in 30-month ball-mill test

A gruelling 2½-year cement-grinding test proved two big advantages of Ni-Hard* iron mill liners:

(1) uniform wear and

(2) longer life by far.

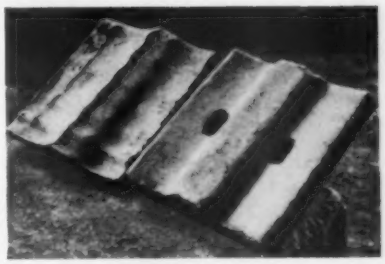
The Pretoria Portland Cement Co., Johannesburg, South Africa, tested Ni-Hard mill liners against six other materials . . . in a 20-ton-per-hour dry cement mill using 2 to 4-inch grinding balls.

Ni-Hard liner plates resisted abrasion 6 times better than those of the next best material. The Ni-Hard liners lost an average of only 7.9 pounds per segment: second best material lost 50. Another material averaged a 79 pound weight loss per segment.

The reason: Ni-Hard is a nickel-chromium white iron alloy specially developed for outstanding abrasion-resistance.

Ni-Hard liners stay hard, keep their shape down to the last ¼"... increase grinding efficiency and deliver long-term savings.

If you'd like to grind more cement with less downtime, contact your nearest Ni-Hard producer for information about Ni-Hard liners for your own mills. Or, write Inco today for a list of authorized producers and helpful technical information.



HERE'S THE PROOF . . .

Compare these plates, shown after several years' cement-mill service. Left: alloy-steel plate. Right: liner plate of Ni-Hard cast iron.

*Registered trademark

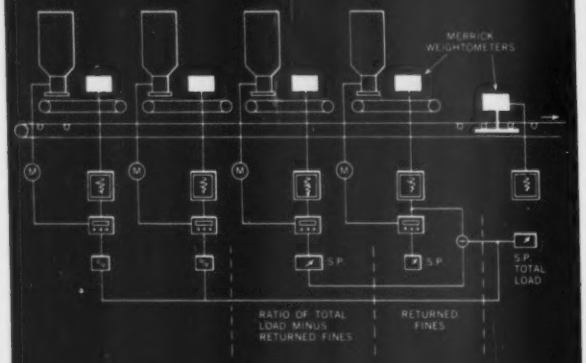
The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street INCO New York 5, N. Y.

NI-HARD

NICKEL ALLOYS PERFORM BETTER LONGER

For precision blending of bulk materials AUTOMATICALLY...

Here's how Weightometers can automate a typical blending system...



Loading is made at the set-point station, which imposes an output voltage signal to all ingredient control stations. All materials are controlled to a percent of the total load required. Recoverable material set-point is determined by returned product available. Feed is controlled by difference of returned material and total load of master set-point.

Merrick
WEIGHTOMETERS®

not only weigh and record the amount of material passing along a conveyor, they can be used to automate complete production systems. The blending system diagrammed above is typical. Integrating and recording arrangements can be electronic, mechanical or electro-mechanical.

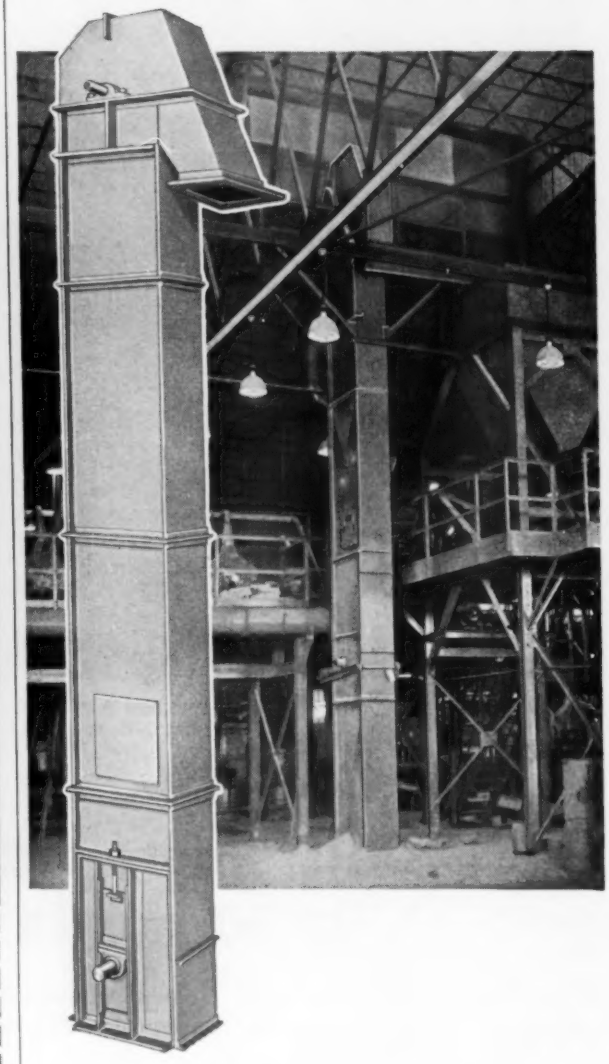
Write us today for complete information.

Merrick

more than fifty years of "firsts" in automatic weighing

MERRICK SCALE MANUFACTURING COMPANY
180 Autumn Street • Passaic, N. J.

EHRSAM® for continuous
LOADABILITY!



Engineers who specify conveying systems today demand quality – equipment proven to speed processing and maintain continuous material flow. They look beyond price to design and craftsmanship. An Ehrsam bucket elevator adapts to existing equipment for easy installation. Dramatically increases productivity. Ehrsam frees you from critical design and fabrication costs and bears the responsibility for efficient operation throughout its useful life. Behind quality is management's "no-orphan" policy . . . Ehrsam refuses to abandon one piece of equipment in productive use. Ehrsam supplies a wide range of products to fit your material flow pattern . . . at your desired pace . . . for increased profits. Call one of the seven district offices below for complete information.

The J. B. EHRSAM & SONS MANUFACTURING CO.
ENTERPRISE, KANSAS

DISTRICT OFFICES | Kansas City, Kansas / Denver, Colorado / Chicago, Illinois
Fort Worth, Texas / San Francisco, California
Phoenix, Arizona / Hastings, Nebraska

EI 2-461

Enter 186-A on card, page 241 *Enter 186-B on card, page 241*

"My Boss Read the Specs with Tears in His Eyes"

He looked like he'd lost his best friend — money.

"Goodbye contract," he said quietly. "We just can't hope to meet these government specifications for aggregate."

"Yeah, it's pretty hopeless with our set-up. Of course, if we had a hydraulic classifier — " (I was kidding.)

"You're out of your mind. Around here water costs more than sand."

"Well how about an air separator, like Sturtevant makes?" I shot back. "Pete's brother runs a pit at Rapid City and says they clean sand without water. By de-dusting it."

He was skeptical. "Aren't Sturtevants for cement?"

I nodded. "They are, but you see quite a few in aggregates, too, nowadays. Might be worth a try."

The Boss smiled for the first time that morning. "What the heck are you waiting for? Get 'em on the phone and let's see what they can do."

So we got the contract, thanks to the 12 ft. Sturtevant we now use for de-dusting and pre-classification. It's a beaut. Gives good service outdoors the year round, with no protection except for the motor housing.

If you're in this business, Brother, it might pay you to have a good long look at what a Sturtevant can do for tight aggregate specifications.

Sturtevant Air Separators classify production loads up to 150 tph by exact control of air currents and centrifugal force. Simple, quick adjustments make possible the selection (or rejection) of particles in the 30 to 400 mesh range. Nine standard models available, varying in size from 3′ to 18′.

Learn how a Sturtevant Air Separator can help your aggregates production. Write today describing your needs. Address: Sturtevant Mill Co., 104 Clayton St., Boston 22, Mass.

STURTEVANT AIR SEPARATORS CLASSIFY SAND WITHOUT WATER

PRODUCING CLEAN SAND, the Sturtevant acts as a de-duster by removing fine mesh particles from the throughput. Particularly valuable where water is limited.

EASING SCREEN LOADS, the Sturtevant rejects unwanted fines and circuits coarser sizes to screens for grading. By this pre-classification, the possibility of blinding screens with fines is minimized and output considerably increased. Also, excessive dust problems are eliminated.

WHEN BLENDING IS NECESSARY, the Sturtevant selects fines from the crushing operation. This stockpiled product then can be used in the blending operation to overcome fineness modulus deficiencies.

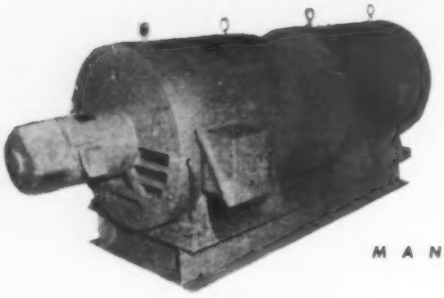
GRINDERS
CRUSHERS
PULVERIZERS
MICRON-GRINDERS

STURTEVANT MILL CO.

Dry Processing Equipment

The "OPEN-DOOR" to *lower* operating costs over *more* years

MIXERS
BLENDERS
ELEVATORS
AIR SEPARATORS



MARATHON ELECTRIC MOTORS

are at work at

DEWEY PORTLAND CEMENT CO.

(TULSA PLANT)

THE THREE UNITS PICTURED ARE TYPICAL OF THE THREE HUNDRED NINETY MARATHON ELECTRIC MOTORS AND GENERATORS IN USE AT THE TULSA PLANT RANGING IN SIZE FROM 1 TO 600 HORSEPOWER AND FROM 3 TO 300 KILOWATTS

Marathon Electric

MANUFACTURING CORPORATION

MOTORS

Home Office and Factory at Wausau, Wisconsin

Factories at Erie, Pa., and Earlville, Illinois

Offices in Principal Cities

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Limited quantities still available!

YOU CAN STILL ORDER COPIES OF

PIT and QUARRY'S *Comprehensive* PORTLAND CEMENT PLANT MAP

Here is all of North America in a single map to provide the best available source for the following information—

- name and location of portland cement producing and distributing plants
- name and location of grinding plants and plants now under construction
- type of process used by each plant
- plant capacities in bbl/year
- brand name of cement produced

Order direct from PIT and QUARRY at these prices—
1 to 10 copies—$1 each 11 to 25 copies—.75 each over 25—.50 each

PIT AND QUARRY *Publications*

431 S. Dearborn St. Chicago 5, Ill.

GRIND MORE CLINKER AT LOWER COST/BARREL

by installing Pennsylvania Fine-Reduction Reversible Impactor ahead of finishing mills

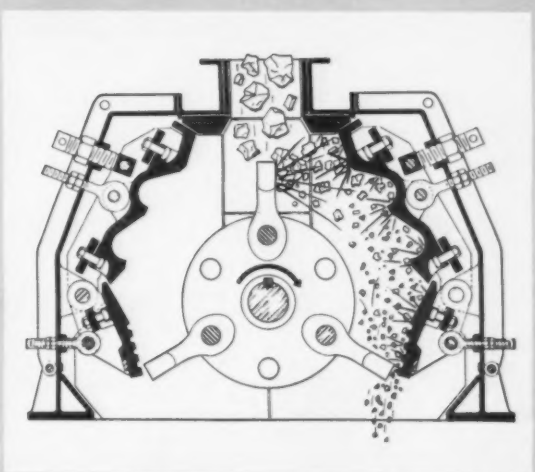
Pennsylvania 5-38 Fine-Reduction Reversible Impactor occupies less than 18 sq. ft. of floor space. Note in cross-section drawing, the multiple action impact crushing of a Pennsylvania Fine-Reduction Reversible Impactor.

Pennsylvania Fine-Reduction Impactors producing fines for feed to finishing mills can increase clinker grinding capacity by as much as 35 percent. Existing installations in cement plants prove the value of compact Fine-Reduction Impactors to precrush clinker . . . effect large economies in the grinding operation.

In a single pass through the Impactor, clinker is exposed to multiple action impact crushing as it ricochets back and forth between whirling hammers and adjustable breaker blocks. This multiple action crushing by impact produces a maximum of fines. The finer the feed to the finishing mills, the less work to grind the clinker to correct size. Also, grinding balls can be smaller in size to glean additional grinding capacity from existing mills.

The multiple crushing action of Pennsylvania Fine-Reduction Reversible Impactors is also a real profit-making factor in tertiary crushing of limestone and cement rock. This low-cost, sturdy crusher with its multiple action impact crushing raises the percentage of fines to the raw grinding department. With a finer feed, the raw grinding mills can handle as much as one-third more tonnage without a heavy investment in additional grinding mills or other raw processing accessories.

The compact Pennsylvania Fine-Reduction Impactor, occupying a minimum amount of space between the existing secondary crusher and the raw grinding mills, is the best way to obtain more capacity from existing equipment within a tight, new-equipment budget.



LET A TEST RUN PROVE IT!

Pennsylvania Crusher's extensive laboratories in West Chester are available to you at no obligation to determine if *your* raw and clinker grinding capacity can be increased to the degree enjoyed by other cement plants.

Your Pennsylvania Engineer will be glad to discuss Fine-Reduction Reversible Impactors with you . . . or write for free bulletin.

PENNSYLVANIA CRUSHER DIVISION
BATH IRON WORKS CORPORATION
WEST CHESTER, PENNA.

PENNSYLVANIA CRUSHERS

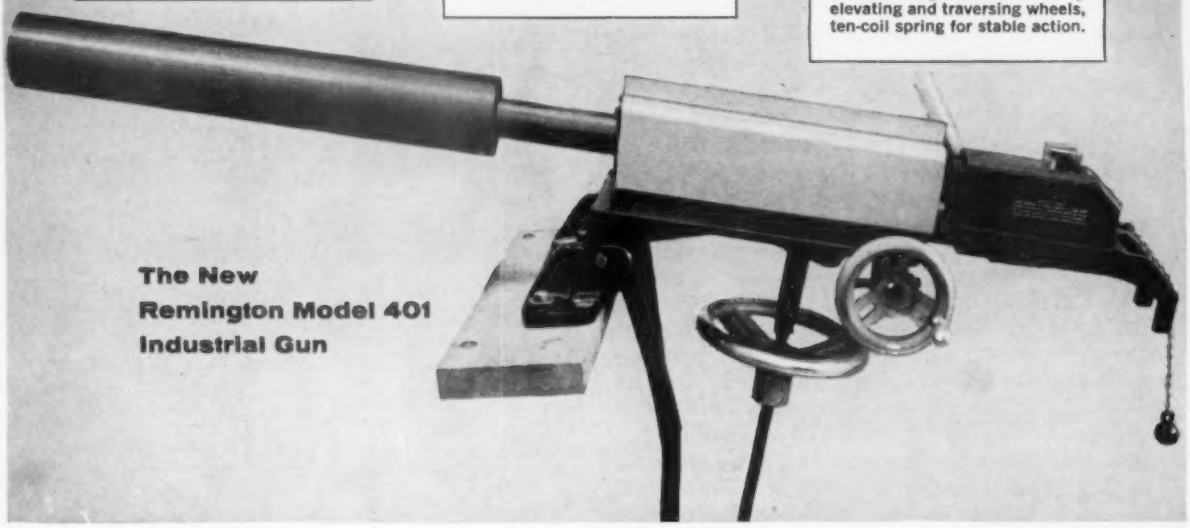
BATH-BUILT

New— Remington Industrial Gun
offers you these operating advantages—

NEW Built-In Muffler... reduces firing noise up to 50%. Strong, one-piece welded construction. Removable.

NEW Stellite-Lined Barrel... gives constant energy to slug, improves ejection, and gives longer barrel life. Breech design permits full-barrel sighting.

NEW Lighter Construction and Recoil Action... makes for easier handling. Aluminum-alloy elevating and traversing wheels, ten-coil spring for stable action.



The New Remington Model 401 Industrial Gun

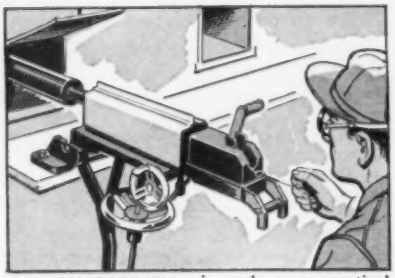
Remove clinker rings in minutes ...save time and money!

You save valuable kiln downtime and man-hours in removing clinker build-ups with the new hard-hitting Remington Model 401 Industrial Gun. It's designed for use in rotary kilns for cement and lime manufacture, refractories and lime-sludge operations. This newly designed gun brings rings and other troublesome kiln formations down in minutes!

No need to wait until the kiln cools. In fact, there's no need to turn off flame or stop rotation until ready to fire. To operate, just load—aim—FIRE—and up to 9,000 ft.-lbs. of knockdown power smashes into the clinker build-up. A few well-placed shots and rotation of the kiln will cause the ring to crumble. Then you're back on a full-time schedule!

Here's the easy, cost-saving way to remove build-ups—without damage to kiln or lining. The new Remington Industrial Gun and one man can save you money.

For information about the advantages of this new gun and how it will help solve your clinker build-up problems, write to the address below.



ONE-MAN OPERATION is made more practical by the special construction of the new Remington Industrial Gun • Spade grip and special corrugated operating handle reduce strain for the operator • Safety features include provision for a protective shield which can be fitted to kiln opening to block heat and clinker fragments • Mortised breech block makes it impossible to fire when breech is not fully closed • New-type ejector gives positive ejection of fired shell. Simpler in design—has longer life.

3 REMINGTON INDUSTRIAL SHELLS

for variety of power...

Magnum Shell—new, improved—3-oz. special lead-alloy slug—delivers 9,000 ft.-lbs. of energy accurately, every shot.

Standard Shell—3-oz. lead slug—delivers 7,500 ft.-lbs. of energy for shorter kilns.

Special Shell—2-oz. special zinc-alloy slug—delivers 7,500 ft.-lbs. of energy.

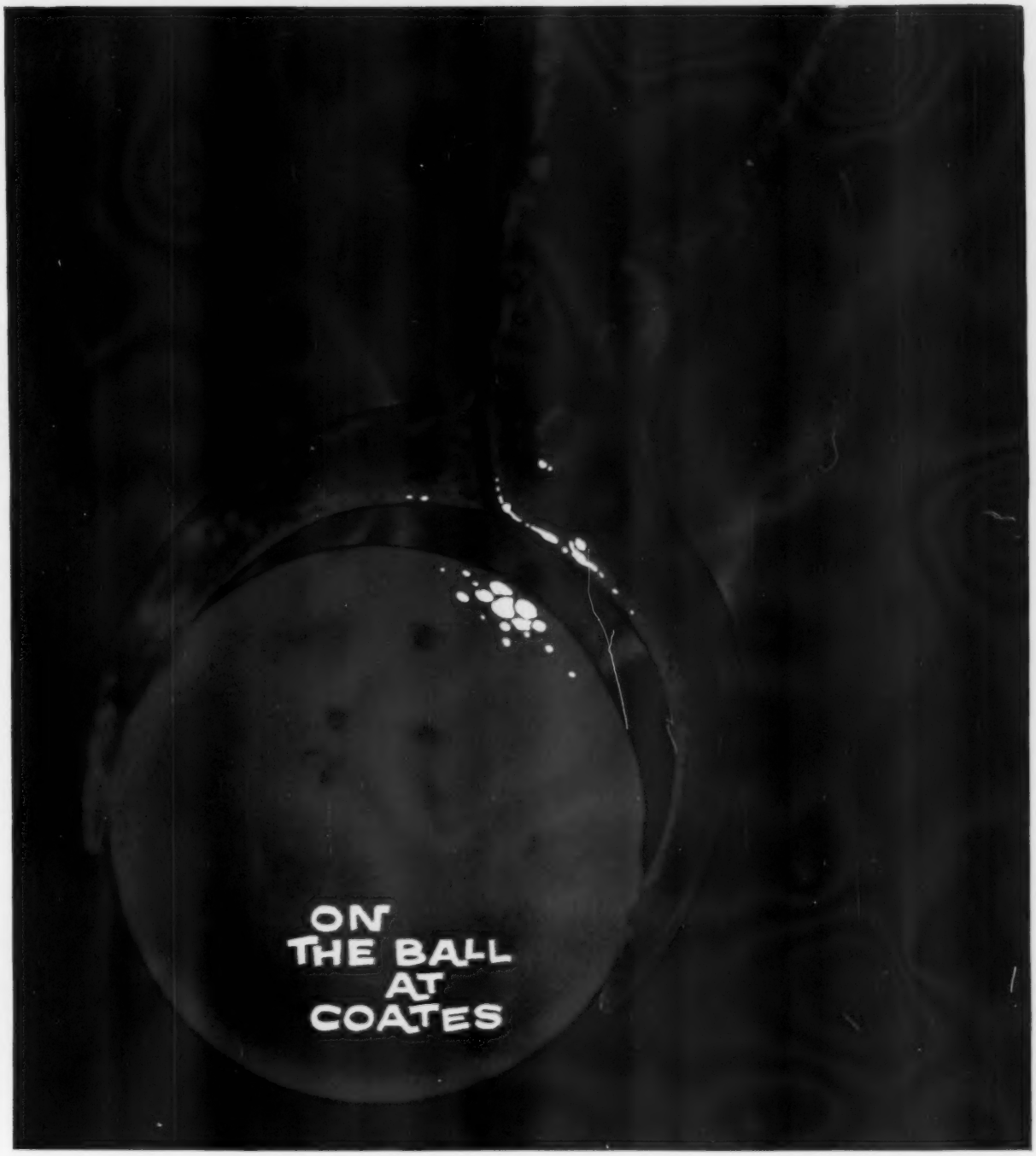
All shells now available in new easier-to-handle packing.

Remington

DUPONT

Remington Arms Company, Inc., Bridgeport 2, Connecticut

In Canada: Remington Arms of Canada Limited, 36 Queen Elizabeth Blvd., Toronto 18, Canada



Write for prices . . . All sizes ½" to 5" carried in stock for immediate shipment.

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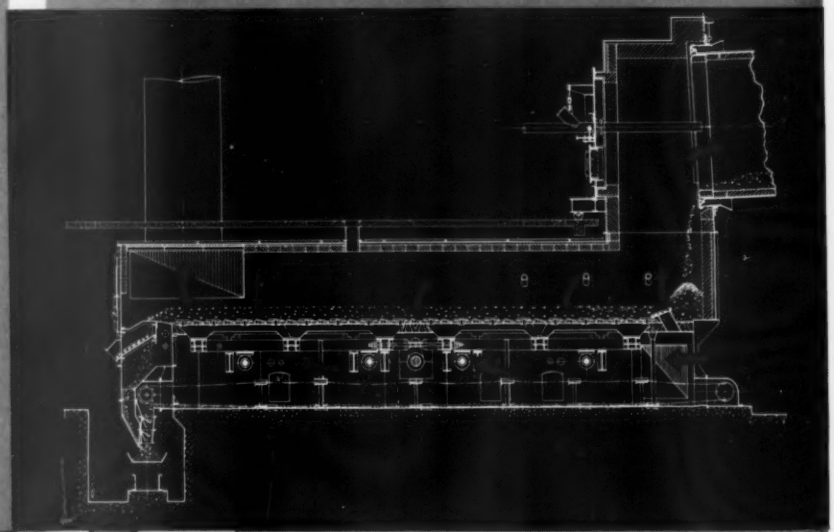

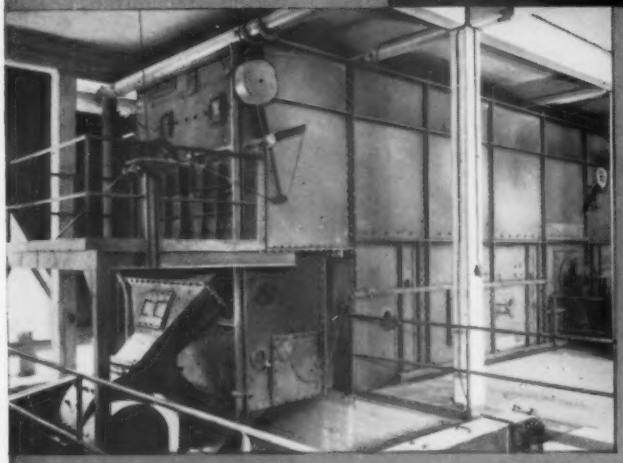

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AGGREGATES, CEMENT, AND LIME:

TARGETS FOR GEOLOGY

• Geology can be of more help to nonmetallic minerals operators than they realize . . . .

By GARY R. GATES and DUNCAN J. McGREGOR
Geologists, Industrial Minerals Section
Indiana Geological Survey

GEOLOGISTS are now becoming available to hunt for things other than oil. Much of the information that a geologist digs out of the earth or out of dusty volumes can be beneficial to producers of aggregates, cement, and lime. Most of these producers know that geology is useful in exploring for raw materials.

Often, however, they do not realize the value of a geologist in fields other than exploration. It is our purpose to outline some of the more practical aspects of geology relative to aggregates, cement, and lime in the hope of fostering a broader application of geology on the one hand and possibly more efficient industrial operation on the other.

Exploration Phase Most operators assume that a geologist may be helpful in finding raw materials, but many of them do not realize why geology is the best means of exploration. Most raw materials currently being used have not been found scientifically, and many operations could possibly have been located elsewhere for a better market-raw material advantage. Perhaps the failure of producers to use geologic methods in locating sand and gravel deposits largely arises because such deposits are thought by many to lack any kind of distributional pattern. Patterns do exist, however, and they can be established by geologic studies.

Geologists are helpful in locating favorable areas for exploration because they have studied the origin, history, and broad regional distribution of many kinds of raw materials. Before undertaking the task of a raw materials survey, the geologist must work closely with market and transportation analysts and with engineers, so that he will know the general nongeologic requirements that a given raw material must have. He can then utilize the voluminous geologic literature to pinpoint favorable areas for more detailed study. If the favorable areas satisfy the nongeologic requirements, fieldwork can be begun, and the necessary steps can be taken to form a basis for recommendations.

After the potential raw material sources have been inspected and a tentative selection based on maximum market-raw material advantage (not necessarily the best area geologically) has been made, a complete and detailed report can be prepared by the geologist. This report should contain a full account of (1) the type and vertical and lateral variability of raw materials; (2) the

Duncan J. McGregor, head, Industrial Minerals Section, Department of Conservation, Geological Survey, Indiana University.

Gary R. Gates, Industrial Minerals Section, Department of Conservation, Geological Survey, Indiana University.

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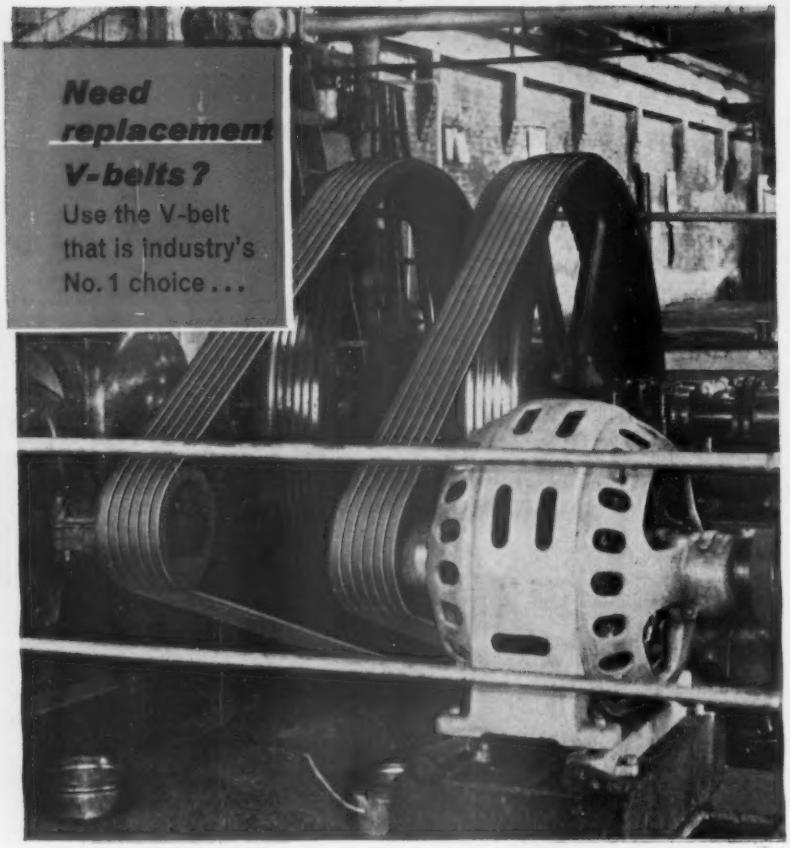

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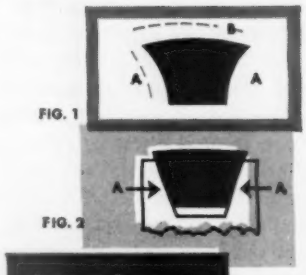

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amount and type of overburden; (3) the problems that can be expected (water problems, etc.); and (4) the reserves. To cover the subject of reserves adequately may require prior drilling or other sampling techniques, and the geologist can best direct such programs. Because reserves are particularly important economically and because they are intimately tied to the markets and finance, the geologist must submit a report *that is designed to help management make decisions.*

If location and reserves are compatible with the market, transportation, and method of financing, management will generally make a positive decision; to make such a decision requires a firm basis. In this day and age, hasty or ill-informed decisions ordinarily do not add up to profits. Management must be convinced that the capital requirement, operating costs, and net sales will all be favorable and that investment will yield a moderate to high return.

Although these matters are in the realm of engineering and economics, the staff geologist should be included in the discussions concerning the economics of the potential operation. He may be able to add more than 2 cents worth of advice because he has been working with the problem from the beginning and is interested in seeing it through. An engineer's cost estimate may not include something that the geologist can point out, *e.g.*, the possibility of required selective mining of a particular layer because of a certain undesirable property in the raw material, or a possible water problem.

We have not elaborated on the methods used by a geologist to locate mineral raw materials. We feel, however, that familiarity with the practical value of geology will give one confidence that he has the best raw material source available for the particular market he has in mind.

Development Phase Because considerable money must be spent in developing a mineral property, maximum resourcefulness is required of the persons responsible for development. The role of geology in developmental work is readily apparent when one considers that the geologist by training knows how to investigate and to study the nature of

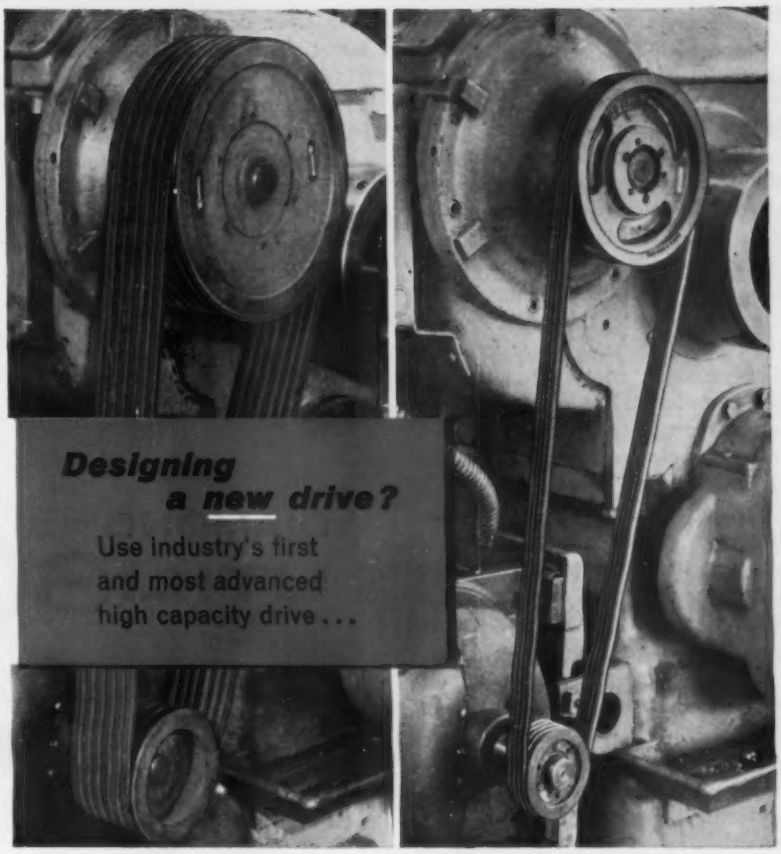
the raw material. Natural raw materials are complex bodies; it is extremely rare to find a homogeneous deposit. (Indeed the geologist will be the first to remark on it if you are dealing with such a deposit.)

The variations of a deposit, whether it be limestone, basalt, gravel, or shale, are *explainable* and *understandable* in terms of the origin of the deposit. A geologist can smell out problem variations in the raw material. For example, the geologist can make recommendations for placing ledges in a quarry to obtain maximum raw material uniformity.

The usefulness of geology does not stop with the mining or quarrying phase of development. We know of an expensive process plant which was erected on some of the best reserves simply because no one happened to drill out the area under the plant. A geologist could have inferred logically that this was a poor location for a process plant and could have recommended sites that would not have interfered with future development.

Operating Phase Once a company reaches the production stage, the staff generally directs its attention to problems of trouble shooting and cost cutting. If the preliminary planning and development have been foresighted, problems may be anticipated and solved before they cost much money, if any. A geologist is competent to handle numerous types of problems, but we shall mention only a few to illustrate the point. As a general rule, a product of uniform quality is most desirable in the competitive atmosphere of the market. It is commonly hard to produce uniform-quality products from raw materials that are almost always variable in nature. It can be done, however, by skillful selection and blending of the different types of raw materials.

Selective mining can be carried out only if the details of variations within a deposit are known and if these variations are understood in terms of what effect they will have on the quality of the end-product. For example, if the texture and mineralogical composition of a rock layer indicate that there will be deleterious material in the end-product, it may be necessary to mine that layer as waste. Blending of



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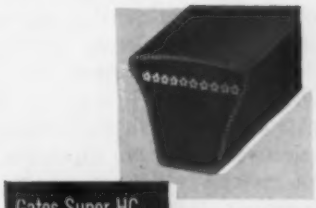

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two or more types of material to meet a certain specification can be accomplished with greater ease and with more efficiency if the geology of the constituents is known.

Blending of raw materials can be done during mining or quarrying or during processing from stockpiles or bins with controllable rates of flow. Although rocks in a quarry wall look alike, they are commonly different in texture, mineral composition, grain size, and other features. The geologist knows what to look for in order to detect these differences. He can divide the rock layers into geologic units and can readily tell the top and bottom of units to be selectively quarried if necessary. Because each geologic unit is sampled to obtain a representative sample and then is analyzed, it is relatively easy to make the proper quarry blend.

Blending by mechanical mixing of materials from several stockpiles or bins can be done only if the composition of the material in the stockpiles or bins has been determined previously. A geologist can classify materials by using several different techniques. Blending is accomplished by proportioning the material from each stockpile or bin. This method of blending is used when rigid chemical requirements are deemed critical.

The geologist can assist in developing uniform-quality aggregates. Blending and selective mining can be used to make crushed stone, sand and gravel, and lightweight aggregate more competitive. Blending and selective mining are expensive, and the geologist will necessarily be cost-conscious. Naturally, if some of the raw material that would normally be wasted can be used with other parts of the deposit, the costs of some operations can be lowered.

Geologists can often think out the solution to problems of processing that might otherwise require trial-and-error methods of solving. For example, heavy-media separation is used to separate light fragments from gravel or crushed stone. The geologist knows (generally on sight) which constituents are deleterious because he knows the basic properties of these constituents. The specific gravity of these materials is known, and the geologist can determine what effect a heavy medium of a given density will have on the material.

Geology (particularly mineralogy) should be an important tool in the study of process control. The basic properties of crystals, including the bonding of atoms within crystals, and the crystal structure, determine virtually all physical and chemical properties of minerals and aggregates of minerals (rocks). Thus strength and weakness, reactivity and inertness, and almost all qualities that aggregate specifications are based upon depend on factors with which the geologist is familiar.

The geologist also has studied the effect of heat on crystals. The study of exothermic and endothermic reactions and phase changes upon heating is a part of a modern geologist's education. The basic reasons for some problems in the manufacture of lightweight aggregate, cement, and agricultural lime are comprehensible in terms of the changes in mineral structure that take place during the heating process.

Chemists deal largely with elemental analysis, but geologists deal with mineralogical analysis. The difference in results from these analytical methods can be tremendous because the significant properties are based on *how* the elements occur, rather than on their mere presence. For example, SiO_2 in an analysis of a rock can be in the form of chert, alpha quartz, beta quartz, crystobalite, tridymite, various clay minerals, feldspars, and numerous other silicate minerals, each of which has different physical and chemical properties.

Looking Ahead Many new developments within our society have forced most industries to change in order to keep abreast of the times. For example, the rapid growth in demand for cement and concrete aggregates has been due largely to increased spending for highways. Highways do not go from aggregate source to aggregate source; instead, they seem to dodge them. We have been assured of this fact by many aggregates producers, who did everything but change political parties to try to persuade road builders to relocate the highways.

Because of this situation the portable aggregate plant was developed. It is strategically located and ready to move as fast as the Fifth Army. The appeal of the portable aggregates operation is, of course, the large market which provides a handsome profit.

The key to success, as we all know, is timing. Because timing is so important, particularly in the portable operation, exploration, development, and operation must be carried out as quickly and efficiently as possible. We feel that the geologist could make the difference between success and failure in many such ventures because he is familiar with the availability, distribution, and nature of raw materials and because of his time-saving abilities of predicting behavior with the minimum of empirical testing.

In the cement industry the operations of the more progressive companies are becoming increasingly mechanized because of the higher output required by increased demand. Mechanization and increased production result in control problems that threaten to overwhelm the operator. Machines cannot do everything and, as we know, they commonly present new problems. Through a basic understanding of the mineralogical composition of the raw material and the distribution of the minerals, a geologist can often resolve problems by considering the thermal and other physical and chemical properties of the constituents of the raw material.

Summary Geology is a useful science which has tremendous present and potential applications in the aggregates, cement, and lime industries. Geology, because it is a science, cannot and should not be considered a replacement for engineering or economics; but the peaceful co-existence of the three approaches can have the same goal: making the largest possible profit. We have tried to emphasize the main applications with which we are familiar. Other geologists might pre-

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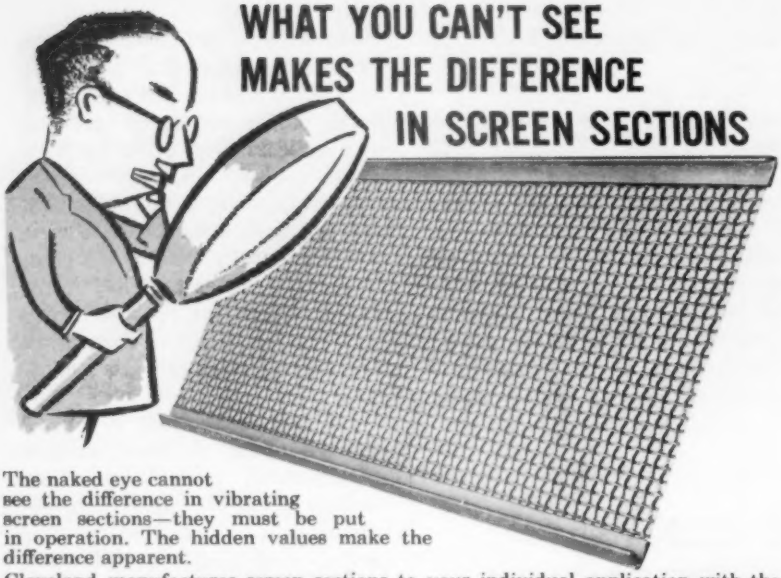

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fer to place emphasis on other points.

If a concern in these industries has problems similar to the ones listed above, we believe that it would be advantageous to discover how geology can help industry. State geological surveys or geology departments of universities and colleges can be of direct help to industry or can assist in selecting for interviews the individuals with the type of training that industry requires.

List of A.S.T.M. Publications Available from Headquarters

The American Society for Testing Materials announces the availability of a 62-page list of publications. Issued in April of this year, this list describes the symposiums, manuals, special publications, indexes, compilations of standards, charts, reference photographs, and reports published by A.S.T.M. More than 300 items are fully described, 40 of which are new.

The publications cover all phases of materials and their evaluations, arranged conveniently by titles and subjects. The list may be obtained free by writing to the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

A new addition has been completed at the Buffalo Crushed Stone Corporation's plant office building near Bowmansville, N. Y. Thus all divisions will be centralized in one office — administrative, sales, accounting, and purchasing departments for the gravel products and concrete products divisions, as well as for the crushed stone and bituminous divisions. The office formerly maintained in Buffalo will be closed.

Eight bulk-loading cement bins, each holding 2,000 bbl., have been installed at the site of Ideal Cement Company's $3,000,000 expansion in Seattle. Still in process of installation are six concrete bulk storage silos 40 ft. in diameter and 120 ft. high.

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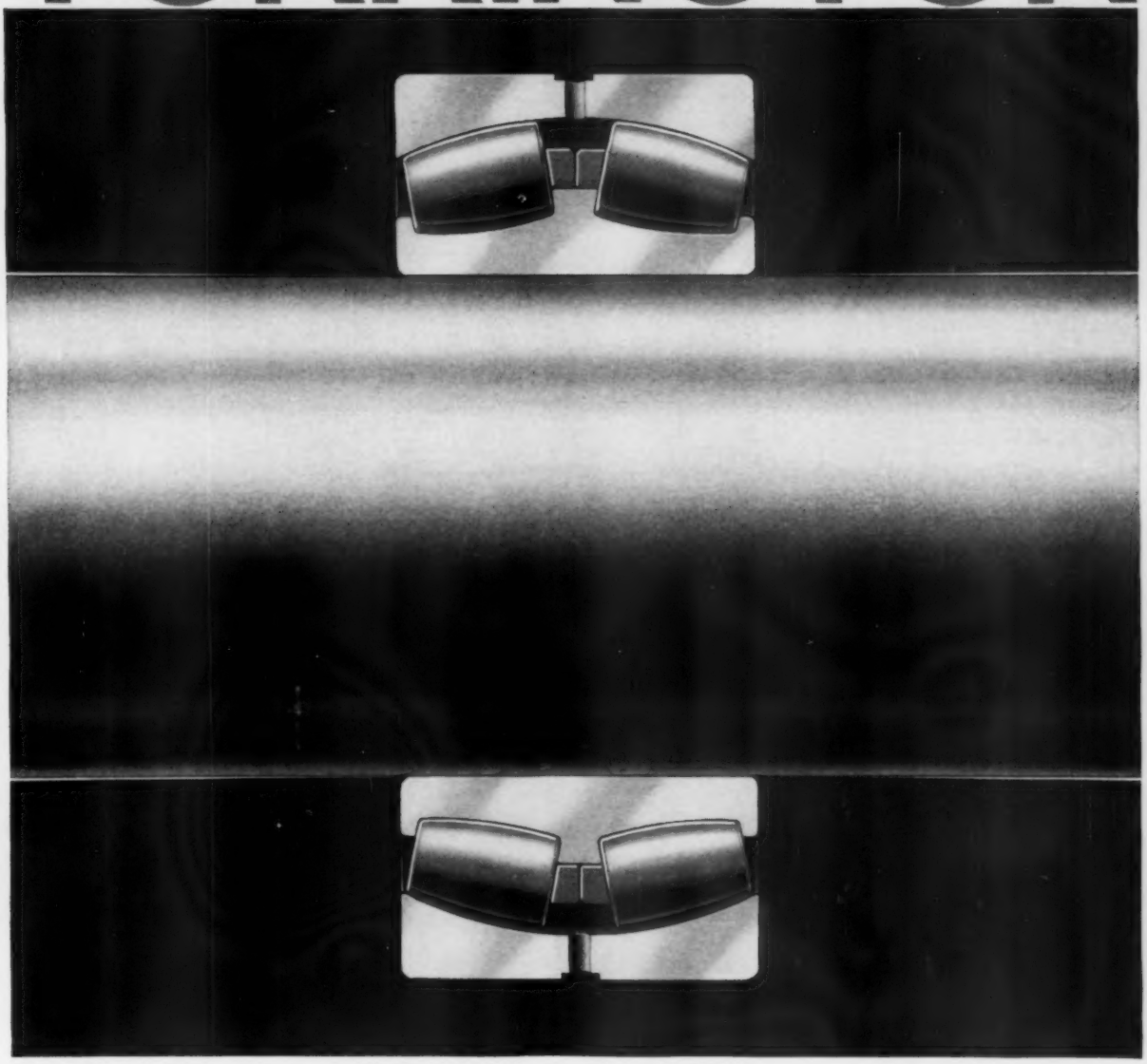

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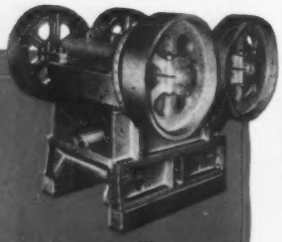

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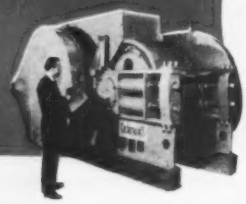

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Application of

ELECTRONIC DATA PROCESSING

To Sand and Gravel and Ready-Mix Operations*

MANY who are not familiar with electronic data processing may think of it in terms of giant computers and electronic "brains." Actually, this is a term that is used rather loosely to cover a multitude of machines and systems. It may be punch card, tabulating, magnetic type, memory storage, or some other form.

Definitions Electronic data processing is a system. The machines serve only to apply the system. Its service and use have just begun to be realized. Ultimately, some say, the changes that may come in the wake of these developments will prove more momentous than those of the Industrial Revolution. Infinitely more is ahead than is in the past.

All machines are devised for a purpose. In the case of data processing, the purpose can be expressed simply: it offers man a means to increase his productivity. I like to think of data processing in my own way as a system of collecting and processing information through the use of machines. Most people who view one of these machines performing some of its tasks for the first time comment, "I wonder who thought of such an idea." Usually, in America, we invent a device to fit a situation instead of a situation to fit a device. That is how electronic data processing had its beginning.

History of Data Processing The Federal Government was concerned over the problem of taking the census just before the turn of the century. It took seven years to take the 1880 census. A statistician from buffalo, N. Y., Dr. Herman Hollerith, came up with the idea of recording this information by punching holes in cards by hand. By this ingenious invention the government was able to take the 1890 census of 62,000,000 people in three years, compared to seven years for the 1880 census of 50,000,000. This was particularly important since the Constitution calls for a re-allocation of the seats in Congress every ten years.

Around 1900 Dr. Hollerith and others adapted his invention to commercial use. From this early invention many different types of systems and machines have evolved which keep up with American businesses, both large and small.

Why Adopt Processing Machinery? Why should we embark on such a task of applying our records to machines in the sand and gravel and ready mixed concrete business? How many times one hears this comment from management: "We have a system that we have been using for 50 years, and we are doing all right. It satisfies the Internal Revenue Service and our auditors. Why should we consider such a revolution in the way we keep our records?"

It is well to keep an open mind for any possibility of cutting your costs by a better understanding of your business. You, as top management, are faced today with problems that no other management in history has been faced with. You have a responsibility to your board of directors, your stockholders, and yourself to operate your business in such

*From an address delivered at the joint annual conventions of the National Sand and Gravel Association and the National Ready Mixed Concrete Association at Bal Harbour, Fla., January 26, 1961.

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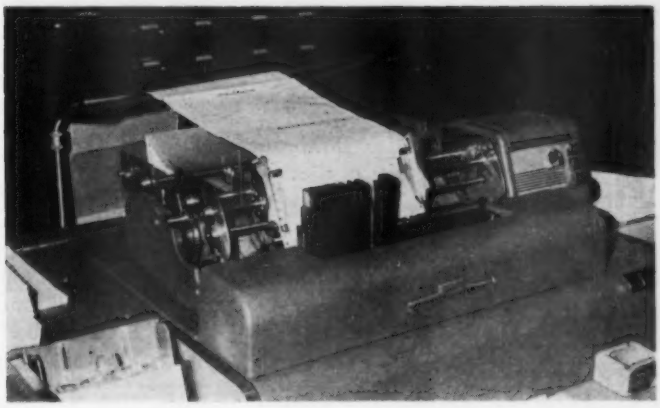


a manner that will ensure a fair return on investment and keep your company economically healthy.

This is not an easy task today. As this year unfolds, in all probability you will be faced with decreasing sales, increased costs, and depleted profits. Your depreciation reserves will not replace your plant and equipment. When new equipment is needed, you will have to dip into after-tax earnings for a great part of their cost. You will be able to retain only 48 percent of your profit dollar. Out of this 48 percent must come funds for plant expansion, a part of plant replacement, dividends to your stockholders which they justly deserve, and the continually increasing need for additional working capital.

Your competition will be greater, not only from your own industry, but from new and substitute products. It is predicted that the gross national product will be down to 490 for the first half of 1961, as compared to 505 for the last half of 1960.

Being Fully Informed Is a Must How will you, as top management, meet this momentous challenge? You will have to be a better manager than the next man. The year 1961 will separate the men from the boys in business. In order to improve the efficiency of your company, you must know more about it. You must be close to it. With the cost of your raw material, your labor, and your sales price more or less fixed, you must resort to more rigid cost control. You must have current, accurate, and detailed information on all of your operations at your finger tips at all times.

For many years the concept of good management was to walk down through the plant a couple of times a day and see that everything was going all right. This is not true today. You must control your business by figures. If a trouble spot develops in one of your operations, you must be able to locate the source, evaluate the case, and act immediately, in order to survive. If you, as top management, are depending on your subordinates to keep you informed, you must give them the tools to do it with. The days of the bookkeeper with the high stool and the shaded cap are gone forever. The world is moving too fast. You must have something that is more accurate, more current, and more detailed for the job. I don't know of a better way to accomplish this than with some form of electronic data processing.

Effects of Data Processing Electronic data processing will have a profound effect on your company, especially on your personnel. You will have problems along this line. Your system will tell you things about your business that you didn't know before. It may uncover pitfalls that you did not know existed. When people know they are being checked by top management, it will effect them in one of two ways. If they are the type of people you need, they will measure up to the test and do a better job. Some of them will resent the system and will not co-operate.

This is where top management will have to step in and make the hard decision. Most people are naturally against a change. It takes time for new ideas to soak in. You can help by letting your organization know you are behind the system. Good management must come from the top. Your company, your business, your organization, and your finished product are a direct reflection of you as top management. If

you are behind the system, your people will get behind it, if for no other reason than self-preservation. You must be on the alert at all times for new and better ideas that will improve your company. You can never stand still—you are either moving forward or backward.

Cost of Data Processing The next questions usually asked are What is the cost? and What are the advantages of electronic data processing? The cost depends on how effectively your system is used. Your machines should be used at least 80 percent of capacity. If your system is installed properly, your G and A expense should not increase. Your rental cost will be offset by a reduction in clerical costs.

As you apply more and more phases of your work to your system, your G and A cost should go down. Savings will come in the form of additional "tools," *i.e.,* reports for better management of your business. I have often heard management say that costs have not been reduced after installing a processing system. If these executives compared the information they are receiving from their system to what they were getting from a manual system, they would see a big reduction in cost.

You may think that your company is not large enough to consider electronic data processing. There are systems on the market today that have a rental value of less than the cost of hiring two clerks. By this measurement, if you have as many as four people in your office, you should consider some form of electronic data processing.

Sometimes sales volume is used to determine whether electronic data processing should be used. Your system can handle billing, accounts receivable, cost system, and general ledger accounting if properly applied. Therefore, I believe that the only true way is to study all of your procedures to arrive at the answer. We have discussed some of these, such as the benefit of understanding your business better. Once you have information recorded on a card or tape, you can use the information as many times as it is needed without manually recording the information again. This is the secret of the system.

It may sound derogatory to the American way of doing business, but is is true: when you replace people with a processing machine, you do away with problems! I have never had one of these machines ask for a vacation, take a coffee break, be sick long at a time, ask for a raise, be in a bad mood, have to be paid time-and-half!

Preparing for Conversion Preparing your company for electronic data processing usually can be accomplished by one of three methods:

1. To authorize the machine manufacturer to make a survey of your company and recommend the proper machines and systems. Most machine manufacturers have a staff of trained specialists who can do this job. They are at a disadvantage, however, because they are trained in their machines and general systems and not in your company's requirements.

2. To employ a consulting firm to do this job for you. There are many fine firms in this field, but they are also at a disadvantage due to the fact they are not familiar with your company.

3. To select some individual within your company who, aided by the machine manufacturer, will design a system that will fit your company. In my opinion this is the best way to do the job. This person should be well versed in the system you now have, but not necessarily experienced in the electronic field. The machine manufacturers have excellent schools and educational programs which this person can attend free of charge.

This person should be someone the rest of your organization respects, someone with imagination, creative thinking, and the will to work. Put this person on the team. He is the kingpin of your system. Your system's success or failure can depend on this person. I am not speaking of a punch-button operator. I am speaking of the one who is in charge of the transition of your system to machines.

Let this individual form his own organization to man the machines; and if he is the one for the job, they will form an organization that is comparable to their own ability. No machine is better than the people who man it. It is very important to select the right people to start with. Request sample reports before your system is designed. Study these reports and be sure they are what you want and need.

Suggested Implementation Procedure After your system is installed, don't expect it to be in full production over night. Insist that *one phase* of your records be applied to the system at a time. Don't try to apply only a part of the phase at a time. your savings in cost come from multiple use of data. For instance, if you apply the billing procedure to the system first, insist that statement writing, sales analysis, inventory control, and any other job that will make multiple use of the data used in billing be applied at the same time.

Keep your customers in mind when you design your system. No sale is ever complete until the goods have been delivered, accepted, and paid for. If you have more than one corporation billing the same customer, consider a sales division to handle all your billing and accounts receivable. If your cus-tomers are retail customers or people who do not keep a complete set of records, consider an itemized statement and ledger sheet. This will be most helpful in dealing with mechanic's liens, matching of jobs, delinquent accounts, and customers' inquiries about their accounts.

There is usually a considerable delay after an order has been placed for machines before final delivery. This period gives you time to plan your system and get some of the kinks out of it before the machines arrive. Often in analyzing your present system for electronic data processing, you will find considerable savings in eliminating duplicate and unused records and reports. We just don't take time to analyze our systems and bring them up to date. Contrary to some people's beliefs, these machines are not gadgets into which you dump a stack of papers and get the answer from the other end. It takes planning, study, trial and error, and hard work to make your system a success. I don't know of any better way to disrupt your organization and make your system

a failure than to try to apply your entire system to the machines at once.

Results of Processing System After your system has been installed and working, what should you expect of it? The accountants, controller, company auditor, or the one you may have in charge of your system may try to apply only statistical reports and information to the machines. In this way you lose the efficiency of the system. Take your basic records and explode them into systems that will be beneficial to you. There are certain records that must be maintained today to comply with existing state and federal laws. The reports you use in management are by-products of these records.

Accounts receivable make up one of the most important parts of your records. A recent survey of some of America's leading businesses revealed that 35 percent of the sales increase for these companies came from marginal accounts. Your credit department can increase or decrease your sales. This does not mean that you must take additional risks to increase your sales. With careful credit managing, you can increase your sales without taking unnecessary risks. You should request current aging of your accounts receivable at all times. This is an easy task with machines.

You should request sales analyses that will reveal what you are selling; who is buying it; the performance of each salesman; whether the salesmen are selling the products that have the greatest margin of profit, and not just the products that are easy to sell; what percent of the market you are getting; the markets that could use your products and are not being penetrated; and a vast amount of other data that would help your sales department.

Your gross profit should be analyzed by products, by districts, and by customers. You should know whether you are getting the proper turnover of your inventory.

One Firm's Use of Processing Use your machines to their fullest extent. We, at Herbert's, try to use this system in considering jobs for the machines.

1. We analyze all reports to see whether they are necessary.
2. We analyze our records and business to see what additional reports are needed.
3. We check our basic cards to see whether we have the information stored for the report. If not, we determine at what point in the processing it would be most feasible to punch these cards.
4. We determine who should have a copy of these reports and how many copies are needed.

Time and Motion Economy Often, if a number of copies are needed, the report can be printed on duplicating masters and run through a duplicating machine. This will save typing. When you have more than one corporation's books on the machine, try to design the reports for each company in the same way. This method will cut costs by saving control equipment and machine setup time.

In designing your system, build in audit trials. Your own auditors, outside auditors, and the Internal Revenue Service will appreciate it. Don't try to switch back to a manual system before you are finished with information. It is not a difficult task to post your journals, ledgers, and even balance sheets and profit and loss statements with the machines. This can be done, for instance, with the same card with which you billed your customer. As many as 15 reports or uses of information can be made with one manual punching.

Goals Are Important As we have discussed before, your profits for 1961 will depend on how well you control your costs. In order to control costs, you must have some goal to work for. It may be last year's performance, the average of the last five years' performance, a time and study report, or some other goal. The important thing is to have a goal. If we don't give our people something to reach for, they will be complacent with what they are doing and slip deeper and deeper into the rut. It is not enough to set an over-all goal for your company. It must be broken down into each operation and each cost within that operation by the month or the cut-off period.

Your standard to work for should be broken down in the same way and compared. You can't wait until the year is over and say, "We will do better next year." You must know what you are doing from day to day. We have often heard the remark from management, "We are doing the best we can, so why be concerned about costs?" *Are* you doing the best you can? How good or how bad are you doing? You must have something for comparison. Management may think that if sales and production have increased, the company has done a good job. Sales and production are not yardsticks by themselves. If these sales were not made at a profit, it would have been better not to have made them. Your control must be throughout the company. A dollar is a dollar, regardless of where it is spent.

Delivery Costs In the ready mixed concrete business your delivery expense represents approximately 25 percent to 35 percent of the total cost of a yard of concrete. We, at Herbert's, know the cost of each truck per yard per mile—for oil, grease, repair parts, repair labor, tires, fuel, garage expense, depreciation, taxes, insurance, and supervision. With this report we can measure the efficiency of each driver. We determine what make and size of truck we should use, and many other important questions. We have a comparable system for each of our operations.

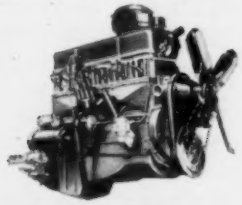
The association's have given us reports to measure the efficiency of our companies. These reports have been most helpful in comparing our operation. Reports are good. They are effective tools. They will cost money; but they are of no use to you if you don't understand them, analyze them, and act accordingly.

According to members of the Scripps Institution of Oceanography, a 10-ft. layer of dolomite was found in a core obtained by drilling the ocean floor 18 miles off La Jolla, Calif. The layer was 750 ft. below the floor of the San Diego trough, which is 3,000 ft. below the water level.

CHEVROLET

HERE'S WHY IT'S A GOOD IDEA TO GET A CHEVY PICKUP:

Because Chevy's wide choice of models (there are 15 of 'em!) means you'll get the *right* pickup . . . because each is engineered to the highest standards . . . because Chevy's rugged, smooth-riding build lasts longer, costs you less to own and keeps your profits at peak levels. Chances are, whatever you consider most important, you'll find Chevrolet has thought of it first, and done most about it. Whether you get a handsome Fleetside or handy Stepside model (or possibly a Corvair 95 Rampside or Loadside or one of a half-dozen four-wheel-drives) you'll soon be convinced that buying a Chevy pickup was the best idea you ever had!

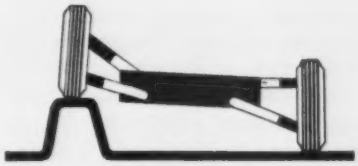


ECONOMY

The Chevrolet slant on economy makes the most sense of all, with the tight-fisted 235-cubic-inch Thriftmaster 6 (standard) leading the way. It's the most experienced money-saver going, one that's powered more payloads than any other engine in the business. It's famous for its stingy way with a gallon of gas and also for its rock-ribbed durability. It keeps your Chevy at work, making money, instead of in the repair shop, costing. And if you prefer the extra snap of V8 power, there's the eager, efficient Trademaster V8, 160-horsepower strong and available at nominal extra cost in all conventional pickup models.

CAPACITY

Chevy pickup bodies—6½, 8 or 9 feet long—are tops in cargo capacity and convenience, with a long list of bonus-built features to keep them working better and looking their best from delivery to trade-in. Both Fleetside and Stepside models feature select wood floors for better footing and quieter going, with steel skid strips to ease loading and unloading. Extra strong grain-tight tailgates with anti-rattle latches and support chains minimize bulk cargo leakage and offer firm support for extra-long loads. Fleetside body sidewalls are double-walled in the lower section, for extra rigidity and protection of exterior surfaces against dents caused by shifting cargo.



PROFIT-★★★★★-PROTECTING RIDE

All of Chevrolet's 2-wheel-drive pickups feature years-ahead Independent Front Suspension design, with ride, roadability and ruggedness that are paying off for truckers everywhere. The reduction in driving effort and fatigue that makes a bigger day's work come easy is just one part of the three-way Chevy payoff. The same shock-cushioning action protects your cargo against damage en route, and also protects the truck itself against the bumps that can batter the life out of cab, body and chassis components. Sounds too good? . . . sample it for yourself at your Chevy dealer's, soon! . . . Chevrolet Division of General Motors, Detroit 2, Mich.

1961 CHEVROLET STURDI-BILT TRUCKS CHEVROLET

Industrial Minerals Discussed at American Mining Congress Coal Show

A HIGH point during the eminently successful Coal Show of the American Mining Congress, held in Cleveland May 15 to 18, was a technical session devoted to cost cutting in open-pit mining, particularly as applied to industrial minerals.

Howard Hanks Jr., operating engineer, Marquette Cement Manufacturing Company, Chicago, described a *Program for Maintenance of Mobile Equipment*. The speaker covered three broad areas of the subject: preventive maintenance, maintenance training, and maintenance management. The first section concentrated on the organization of a good preventive maintenance program, and listed some of the factors contributing to its success. Slides were used to illustrate these points.

Types of training and classes were categorized in the second part. Finally, a philosophy of maintenance management was developed around a list of records needed by foremen and supervisors. Hand-outs included a check list with which others could evaluate maintenance programs and a bibliography of maintenance articles for use by persons wanting to explore certain areas further.

John G. Warner, plant manager, Chemstone Corporation, Strasburg, Va., discussed *Maintenance at the Operation*.

The speaker pointed out that most firms could reduce maintenance costs through stepped-up efforts on the part of all levels of management, and stated that in his opinion 75 percent of American industry leaders undoubtedly are right in making increased efforts toward cost reduction through preventive maintenance.

Organizationally, maintenance is frequently regarded as a service department. Mr. Warner believes that maintenance becomes more effective functioning in line organization, parallel to production. In evaluating maintenance, factors of costs, productivity, equipment down-time, and inventories should be considered in relation to standards in the same manner as in the evaluation of production. This procedure helps to inspire a competitive spirit, which is a spark plug to cost reduction programs. Maintenance performance, Mr. Warner stated, should be evaluated in a similar manner to that of evaluating production performance.

Records constitute a very important part of a preventive maintenance and cost-cutting program. They must be closely reviewed by staff and line management and will point up areas for greater concentration, and tomorrow's potential trouble makers.

J. R. Kringel, executive vice-president, New York Trap Rock Corporation, chairman of the meeting.

Good housekeeping everywhere is the starting point of preventive maintenance, according to Mr. Warner. He added that communication is the key word for any team pulling together.

James L. Cox, manager of minerals operations, International Minerals and Chemical Corporation, Bartow, Fla., presented a paper on *Cutting Costs Through Operations Research*. Mr. Cox, an engineer and mining manager, who has been closely associated with major operations research projects sponsored by his company, presented statistics of operations research in the mining industry, and also case studies of two major programs.

Illustrating his theme with simple mathematical models, Mr. Cox demonstrated how inexpensive operations research programs have been highly successful in breaking production bottlenecks. He emphasized that operations research does not always involve highly sophisticated methods and electronic equipment, and may be extremely useful at the operational level.

Daniel J. Miller Jr., chief engineer, Houdaille Construction Materials, Inc., Morristown, N. J., discussed *Blasting Vibrations in Quarry Operations*. According to Mr. Miller, the mining industry is getting closer to the day of reckoning with the problem of blast vibrations in populated areas. He touched on shock wave theory, as developed at stone quarries where alleged vibration damage has already become a major consideration, and discussed in detail some of the corrective changes made in blasting practices

PRODUCTION FACTS ON A

Power Shift Traxcavator

25-SECOND CYCLE TIME! De Bord Bros. of San Antonio have a new 955 Traxcavator excavating and truck-loading bank-run gravel. "It *averages* 25-second cycles; loads a 5-ton truck in 75 seconds with about two and a half bucketfuls. Could handle 40 trucks an hour if necessary." De Bord Bros. watched a Traxcavator completely outperform a competitor in a demonstration . . . and then made an easy choice: the 955H.

THE HOW AND WHY OF 955 PRODUCTION: 100 HP, 1¾ yd. standard bucket; finger-touch Cat power shift transmission; automatic bucket positioners. Add a competent operator, and you've got perpetual motion of bulk material.

TRAXCAVATORS WORK FAST

POWER SHIFT TRANSMISSION. One lever gives split-second changes in speed or direction to slash cycle time, keep operator fresh and efficient.

LIVE ACTION HYDRAULICS. You get faster lifting and more digging capacity without robbing power from the tracks.

FAST ACTING CONTROLS. Easy to operate. Automatic bucket positioner and lift kickout speed operation. Excellent visibility and safer design improve operator efficiency.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

GET A DEMONSTRATION. See your Caterpillar Dealer for a complete description of the line of front end loaders (track or wheel-type) . . . and a knowledgeable recommendation of the best machine for your job.

CATERPILLAR

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TRAXCAVATORS ARE MAKING OTHER LOADERS OBSOLETE

Howard Hanks Jr., operating engineer, Marquette Cement Manufacturing Company, discussed maintenance of mobile equipment.

at his company's operation.

The last speaker, H. A. Corre, plant manager, Bellefonte operations, Warner Company, Bellefonte, Pa., presented a film and paper on *Control of Large Blasts to Tonnage Requirements.*

He discussed briefly the purpose of increasing the hole size from 6-in. holes with 18-ft. burden and 18-ft. spacing to 9-in. holes and 30-ft. burden and 30-ft. spacing.

He described how the amount of stone to be shot at his plant is determined by relating it to sales forecast and inventory.

The careful blasting of a high face eliminates the need of smaller blasts, he pointed out, thus preventing interruption of production schedules during the operating season.

The speaker included a complete description of the dynamite used, as well as the methods of loading and detonating the charge.

A full year's supply of stone is broken in a single blast at Warner Company's Union Furnace Quarry by using ammonium nitrate and conventional blasting agents. Shooting a 200-ft. face with 30 to 40 tons of explosives requires careful planning of burdens and spacing and well developed hole-loading techniques—all of which were described.

J. R. Kringel, executive vice-president, New York Trap Rock Corporation, was chairman of the meeting, with Carl F. Clausen, director of the manufacturing process department, Portland Cement Association, as vice-chairman and discussion leader. The excellent papers generated considerable debate and questions pertaining to broad aspects and also details of the subjects covered.

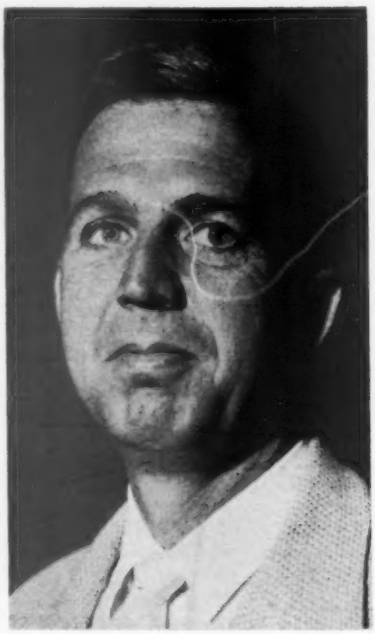
Daniel J. Miller Jr., chief engineer, Houdaille Construction Materials, Inc., Morristown, N. J., discussed blasting vibrations in quarrying.

The Cleveland Coal Show was attended by more than 14,000 persons, approximately 60 percent of whom were "operators" and 40 percent exhibitors. The technical sessions and the exhibits of modern mining, construction, conveying, and scientific equipment were at the Cleveland Public Auditorium.

Other technical meetings covered conventional mining, strip mining, management and cost controls, haulage and power, coal preparation, safety, and new operations in the coal industry.

The traditional "coal miners' party," including dinner and entertainment, had to be held at three local hotels concurrently, due to the large attendance.

There was a unanimous feeling of appreciation and admiration of the planning and execution of all details by the American Mining Congress staff, including Dr. Julian D. Conover, executive vice-president, Robert W. Van Evera, and Martin C. Dwyer. The next Coal Show will be held in 1964.



James L. Cox, manager of minerals operations, International Minerals and Chemical Corporation, Bartow, Fla., presented a study on reducing costs through operations research.

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PLUS ECONOMY
REPLACE WITH
INDIAN BRAND

Get the most out of your present equipment. When you need replacements, remember we started in 1913 to build our reputation in the Manganese Steel field for dependability plus economy.

Insist on
INDIAN BRAND
MANGANESE STEEL

INDIAN BRAND

Shovel Dippers • Dipper Teeth
Shovel Treads
Crusher Jaw Plates
Mantles • Concaves
Bowl Liners • Roll Shells
Pulverizer Hammers
Grate Bars • Breaker Plates
Ball Mill Liners • Screen Plates
Misc. Manganese Steel Castings

THE FROG, SWITCH AND MANUFACTURING COMPANY
Carlisle, Pennsylvania • Established 1881

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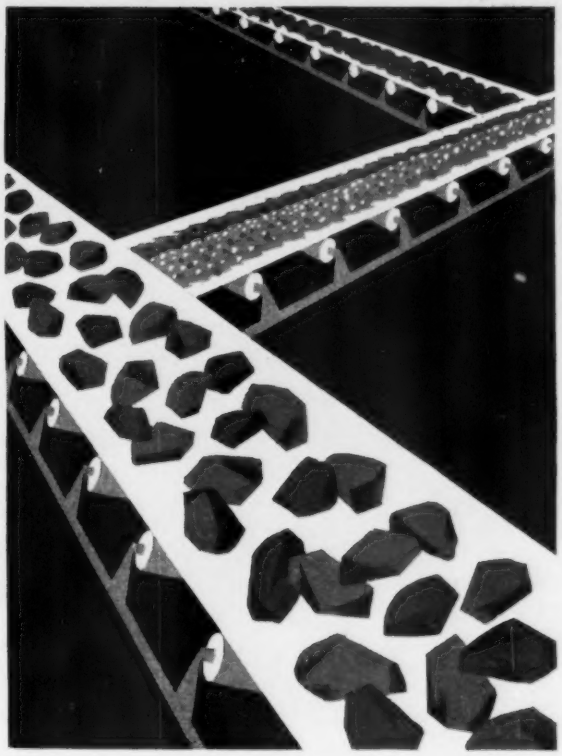

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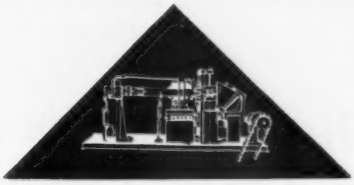
MATERIALS HANDLING

FAIRBANKS-MORSE BELT CONVEYOR SCALES



Now ore, minerals, concentrates, sludges and other materials can be quickly, easily and accurately weighed while they are passing by on conveyor belts. F-M specially designs belt conveyor scales for your specific needs . . . assuring accuracy and economy for your particular operation.

With F-M Belt Conveyor Scales you get simple and positive operation that automatically totals the weight of the materials carried by the conveyor. The accumulated weight is shown on the direct-reading register . . . there's no need to apply multipliers or conversion factors, and a means to provide a printed weight record is available.

The F-M Belt Conveyor Scale is simple in design and construction. The beam and integrating mechanism are housed in a dust-proof cabinet . . . stainless steel and bronze parts mean minimum maintenance . . . aid in the over-all accuracy of the scale.

To learn how F-M Belt Conveyor Scales can save money for your operation, write: **C. G. Gehringer, Director of Marketing; Scale Division; Fairbanks, Morse & Co.; 100 Electra Lane, East Station; Yonkers, New York.**

FAIRBANKS MORSE
A MAJOR INDUSTRIAL COMPONENT OF
FAIRBANKS WHITNEY

As the Dolomite Company knows so well . . . hauling profits depend on the

RIGHT TRUCK ON EVERY JOB

Dolomite Products Co., Inc., Rochester, N. Y., avoids profit-squeezing hauling costs because it has the know-how and experience to analyze its truck needs with an eye to keeping costs under strict control. Loads, terrain, schedules, climate, speeds, etc., all must be carefully weighed in selecting trucks for best all-round performance. For twenty years, Dolomite has been developing the use of Mack trucks in a wide variety of assignments . . . keeping its large and diversified operation rolling smoothly, profitably.

In the quarrying phase of Dolomite's operation, for example, Mack B-813 Models, hauling double-bottom side-dumpers, team up with fast shovels to deliver four to five thousand tons of dolomite rock to the crusher each shift.

Modern efficient high-volume operations like those of Dolomite depend on modern efficient equipment to keep operating costs low. Macks, like the B-813's used in this quarry operation, contribute to high efficiency because of their outstanding performance characteristics. The Mack Turbocharged Thermodyne® engines provide plenty of power for fast get-aways under full loads. Massive self-equalizing brakes and easy, positive power steering assure safe, fast maneuverability at shovel and crusher. Traditional

UNDER THE SHOVEL—Fast cycle time with big loads is needed in quarry work. Dolomite puts big Mack double-bottom side dumpers on this assignment.

AT THE CRUSHER—Turbocharged Thermodyne diesel-powered Mack side-dumper empties quickly at the crusher as another big load pulls into position behind it. These units operate on only 20 gal. of fuel per 9 hr. shift.

FOR STOCKPILING—Crushed stone rolls to stockpile on Mack B-42T combinations. Manitou Construction Co., a division of Dolomite Products Co., Inc., also uses these vehicles to handle material for paving jobs.

Mack construction throughout reduces down-time and maintenance.

These are sound reasons why Macks are first choice where profitable operations rely on truck performance . . . why a Mack will pay for itself again and again by delivering top work capability per dollar invested. Your Mack representative is qualified by knowledge and experience to help you determine the Mack model that will provide the most economical solution to your trucking problem. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario. 0158

MACK
FIRST NAME FOR
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MACK for over 8 straight years NO. 1 by far in sales of diesel trucks

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GARDNER-DENVER GOES ALL

ONE SOURCE—ONE RESPONSIBILITY
COMPLETE DRILLING PACKAGES

From the bit to the tip of the mast, and all the way back to the compressor, these hard-hitting drilling rigs are completely Gardner-Denver engineered. And Gardner-Denver backs every component with its plus services.

1. New, steady-pressure screw feed mast.
2. Independent-control power rotation rock drill.
3. Carburized "HI-LEED"® sectional rod and couplings.
4. Long-life carbide insert rock bits.

Gardner-Denver bit grinders keep spare bits sharp in the field while drilling progresses.

THE WAY TO SPEED YOUR BLAST-HOLE DRILLING

(5) Accurate hole-spotting hydraulic boom and drill positioner.

(6) Time-saving centralized controls.

(7) Drill-preserving air line oilers.

(8) Maneuverable "Air Trac"® crawler.

(9) Mobile, heavy-duty HT143 crawler.

(10) Sturdy mast takes 30′ steel changes.

(11) Hard-hitting, 5½", deep-hole drill.

SEE YOUR GARDNER-DENVER ROCK DRILL SPECIALIST

New Gardner-Denver Rota-Screw portable compressors start up immediately in any weather or climate. Deliver pulsation-free air flow without compressor vibration. Slash maintenance costs because there are no blades or other touching parts in the compression chamber.

PLUS SERVICES ARE BASIC AT GARDNER-DENVER

Sizes and models to suit job requirements • Specialists to help you choose correct equipment • Demonstrations of equipment in the field • Ready supplies of replacement parts anywhere • Trained technicians to give you mechanical help • Engineered durability and maintenance economy • Pace-setting new products to meet job demands.

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GRUENDLER HEAVY DUTY LARGE CAPACITY SINGLE ROTOR IMPACT HAMMER CRUSHER with Heavy Plate Type Feeder

For large ratio reduction of medium hard limestone

Where the requirements have been to crush large size medium and hard limestone and dolomitic type stone you will find the Gruendler Heavy Duty Large Capacity Single Rotor Impact Hammer Crusher with protective tramp metal catcher doing an excellent job. Let us know about your particular problem and the analysis of your stone for your highest tonnage production of aggregates. Complete information (without obligation) about this unit will be sent to you. Also Manufacturers of Jaw Crushers, Hammermills and Material Handling Equipment for handling metallic and non-metallic rock formations, granite, basalt and hard type materials. If it's a Gruendler you can depend on it.

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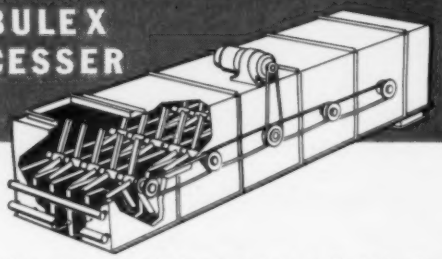
Continuous hot or cold processing costs far less with the new TURBULEX PROCESSER



From calcining gypsum to drying polymers, a Turbulex by Western Precipitation is ideal for **continuous** hot or cold processing of free-flowing solids.

It's ECONOMICAL. Simple design makes it easy and inexpensive to fabricate, operate, maintain.

EFFICIENT. In calcining, thermal efficiency as much as **2½ times** the conventional kettle process — 78% vs 30%!

WIDE USE of the new Turbulex is possible wherever low cost, continuous, efficient processing is needed . . . in industries such as **food, non-metallic minerals, chemical, petrochemical** and **non-ferrous metallurgical.**

WANT DETAILS? For literature, write Western Precipitation, 1000 West 9th St., Los Angeles 54, Calif. (In Canada, write 8285 Mountain Sights Ave., Montreal, P.Q.)

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DIVISION OF JOY MANUFACTURING COMPANY

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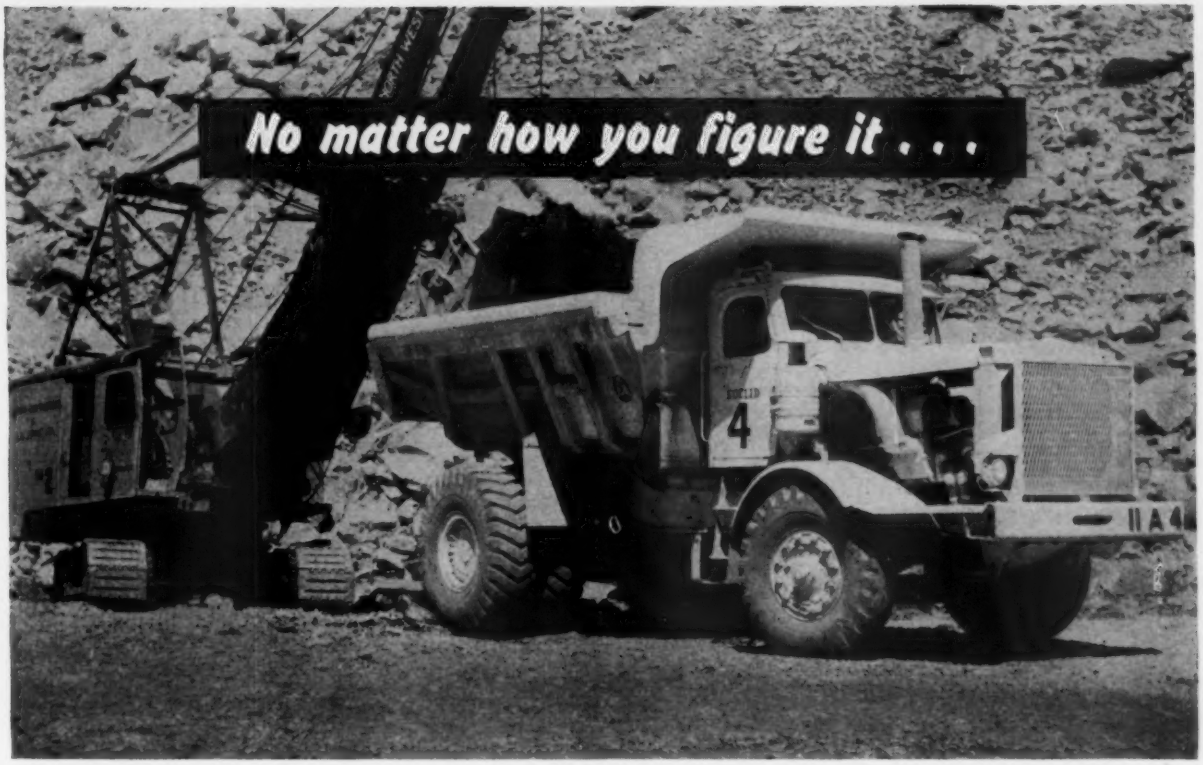

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When you're comparing rear-dump haulers—or any other earthmoving equipment for that matter—reliable performance on the job is the only real measure. For over 25 years Euclid Rear-Dumps have been the outstanding choice of contractors, mines, quarries and industrial users . . . and today more than half of the orders for new "Eucs" come from previous and present owners.

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EUCLID pioneered the major rear-dump features that are "standard" today . . . planetary drive, exhaust heated bodies, double acting hoist, Torqmatic Drive and other engineering advances that cut hauling costs.

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EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Lime in Fertility Plan

(*Concluded from page 96*)

ries, rye, strawberries, and vetch, with tolerances of 5.0 to 7.0. Cranberries and blueberries require a strongly acid soil, with a pH range of 4.0 to 5.0.

These pH preferences apply to mineral soils. With organic soils, peat, and muck, a pH of 5.0 to 6.0 is best.

Chemical, Physical Factors

How does limestone enter the picture? In chemical terms, agricultural lime includes the oxide, hydrate, and calcium carbonate of calcium and magnesium. Besides ground limestone, other lime sources are marl and waste materials from industry.

It is hard to say how long limestone will last in the soil. If sufficient limestone is added according to test, it will last longer. The heavier the application of lime and the coarser the material, the longer the lime will last.

The finer the material, the more quickly it will react with the soil and improve both soil and crops. The lasting quality of an application is far less important than its quickness of action and the extent of the benefits.

Lime disappears from the soil by cropping, pasturing, and leaching, plus wind and water erosion. A growing crop will retard leaching and erosion losses.

Legumes remove more calcium than other crops. Possibly 200 to 300 lb. of lime are lost per acre of topsoil in Michigan each year.

Present-day fertilizer practices increase crop yields, thereby increasing the removal of calcium and magnesium from the soil.

On the average, each pound of nitrogen contained in a commercial fertilizer leaves an acid residue sufficient to neutralize 2 lb. of high-grade limestone.

Application

Most lime applications on farms today are done by spreaders. Sometimes it goes direct from quarries to the local distributor and often directly to the farm, to be spread in the fields. The cost of limestone, delivered and spread, is $6 to $8 per ton. Marl costs about $2.50 per cu. yd., delivered and spread.

The equipment for spreading any kind of lime is not so important as having the lime spread evenly.

For the best effects, lime should be applied a year ahead of the crop it is to benefit. Disking or harrowing the field right after lime application will give better distribution.

If lime is plowed down, it is best to apply on the side of the furrow slice opposite the last previous application.

The rate of lime application will depend on the pH need of the soil, and on the crops to be benefited. The soil technician in the county soil testing laboratory, extension agents, or SCS conservationists can give recommendations as to lime needs. Fineness of lime and amounts to be applied are also factors in making recommendations.

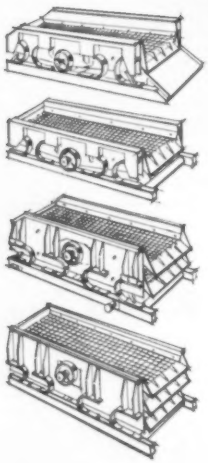
GLENN W. RHODES, West Des Moines, Iowa, recently retired from Penn-Dixie Cement Corporation after 34 years there as chief chemist.

These two 10'x60" double-deck KOLMAN Screens operating in tandem are key units in a portable aggregate plant making specification materials for highway construction.

Step up Screening Profits with

KOLMAN

VIBRATING SCREENS



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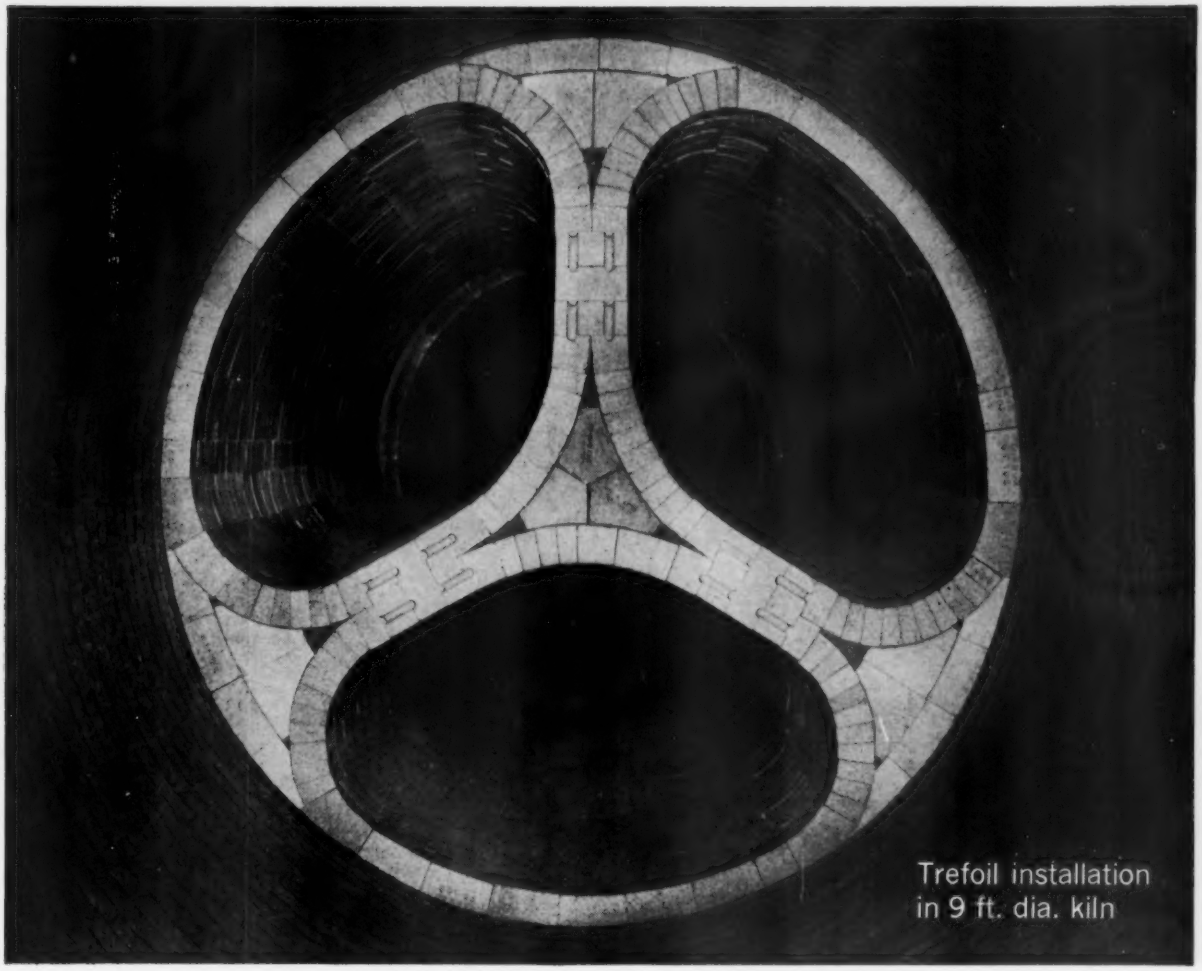

Trefoil installation
in 9 ft. dia. kiln

Refractory Heat Exchangers increase rotary kiln efficiency

Harbison-Walker TREFOIL design provides important benefits

This construction built with refractories especially suited for the purpose is showing exceedingly gratifying economies in rotary limestone and lime sludge kilns. Its use is the means of imparting sensible heat to the charge, even to the degree of partial calcination in some installations.

The structural strength of the trefoil construction is proving its excellent durability. An original installation in a 10′ diameter kiln has now been in service for three years, with indications of considerably longer life. This good service presently is approaching repetition in a number of other kilns.

The magnitude of preheating of the charge in passing through the trefoil tends to moderate the temperature in the hottest zone, necessary for a given rate of production. The development of excessive accretions in the high temperature zones with certain fuels may be reduced and the lining life extended.

Net results from the use of the trefoil are fuel savings and increased production in kilns which are not greatly overloaded beyond rated capacities.

H-W technical service is freely offered in helping determine various details such as length of the trefoil section (usually 15 to 25 ft.) and longitudinal location for the various conditions involved.

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World's Most Complete Refractories Service

HW 60-3

- High Capacity
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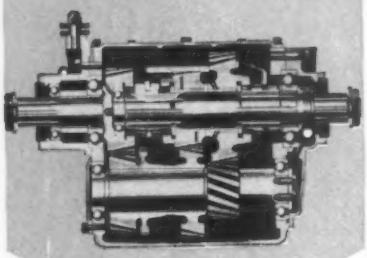

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Auxiliary Transmissions

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Legal Decisions

On Industry Problems

By **LEO T. PARKER**

Attorney at Law

Cincinnati, Ohio

ANOTHER P&D EXCLUSIVE

A FEW days ago I received an interesting letter from a cement contractor, in part, as follows: "What kind of testimony or proof must a contractor give to prove to a court that he delivered materials on a job within the 60 days time limit?"

Recently a higher court held that a contractor cannot have a valid mechanic's lien to secure payment for work and materials, unless he has disinterested witnesses testify that he furnished work or materials on the job before expiration of the 60 days statutory limitation period.

For instance, in *Muenchau* v. *Swarts,* 102 N. W. (2d) 129, a usual state law was litigated which provides that a valid mechanic's lien on real property must be filed within 60 days from the date the last item of materials or labor was furnished on the job.

A property owner, named Swarts, made a contract with a contractor to furnish all work, labor, and materials for construction of a building. Swarts refused to pay the balance of the contract price to the contractor after the job was finished, and the contractor filed a mechanic's lien on the property.

During the trial the contractor testified in favor of himself, and his friends did likewise, but he failed to prove by disinterested witnesses that he had done work on the biulding or furnished materials for the job within 60 days from the date he filed the mechanic's lien. Therefore, the higher court refused to hold the mechanic's lien valid, saying:

"We conclude from the evidence that the plaintiff (contractor) failed to prove his case by a preponderance of the evidence, and failed to file his lien within 60 days from the date of furnishing the last item of material or labor."

Warn Contractor's Employees

Recently a higher court held that all operators of motor trucks are legally obligated to warn all persons, including contractor's employees, on a job, against dangers associated with operation of the truck. Failure of a truck owner to give this warning entitles the injured employee to sue and recover damages instead of accepting compensation under the State Workmen's Compensation Act.

For illustration, in *West* v. *Mount Vernon Sand and Gravel, Inc.,* 355 Pac. (2d) 795, it was shown that a laborer named West was injured when struck from behind by a "premix" cement truck operated by the Mount Vernon Sand and Gravel, Inc. At the time West was walking down a "pour" lane toward his designated place of work. The testimony showed that this particular truck was moving substantially faster than normal, and that the Mount Vernon Sand and Gravel, Inc., did not have a man to walk behind the truck to guide the driver and warn other employees of the danger.

Since West was employed by a contractor, he was not within the scope of the industrial insurance carried by the Mount Vernon Sand and Gravel, Inc., under the State Workmen's Compensation Act. Therefore, the higher court held that West could sue and recover heavy damages from the Mount Vernon Sand and Gravel, Inc., and said:

"The concrete truck that injured him was in the act of delivering concrete for use in the construction of the building. The respondent was preceding it to the place where he was to perform his assigned task in

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Special report to users of Cat D6 and D7 track parts

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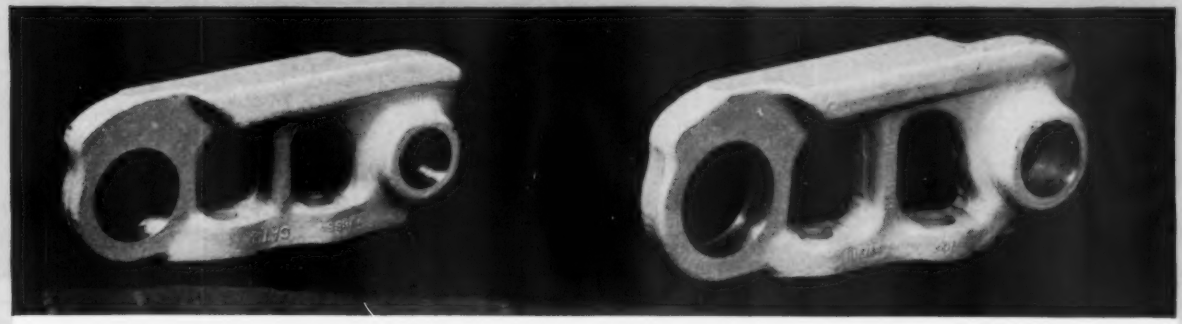
Parts you can trust
... cost less per hour

Up to 25% Longer Link Life at No Increase in Cost

New track links have rails hardened deeper than any other brand . . . hardness with file-like, wear-resistant qualities

You can't "see" metallurgy and heat treatment in track links. But you'll definitely see the *results* in the extra life you get from the *new* Cat D6 and D7 track links. These superior links will outlast all other brands yet the suggested price is no higher than before.



D6, 955 AND 561 LINKS

- "Hi-Electro" hardened rails give outstanding wear life.
- Rail wear cases are twice as deep as other brands.
- Closer bore tolerances retain pins and bushings better.
- Full 1¼" top rail surface to pin boss clearance allows more wear before roller flange contact.

D7, 977 AND 572 LINKS

- 12% thicker rails eliminate peening, rebuilding distortion.
- 32% thicker struts and more steel in critical areas increase over-all strength, resist cracking.
- File-hard "Hi-Electro" hardened rails withstand abrasive wear.
- Uniform, wear-resistant rail cases deeper than other makes.

These new track links are made from special steel, carefully pretested *before* manufacture. They're forged, machined and heat treated to develop maximum strength and toughness. A non-peenable wear barrier is induced *deeply* into rail top and sides by exclusive "Hi-Electro" hardening. This exacting heat treatment permits maximum, file-like wear resistance without brittleness.

Try the new links . . . and the many other *special-purpose* tractor undercarriage parts, all designed and built to keep your cost-per-hour to a minimum. Cat undercarriage specialists can help you select right combinations and give you money-saving recommendations tailored to your particular needs. It's all a part of your Dealer's Custom Track Service . . . the practical approach to lowering undercarriage costs by extending part life and machine availability through proper parts selection and parts care.

Etched rail cross-section shows deep, uniform wear case found on top and sides of new links.

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Caterpillar Tractor Co., General Offices,
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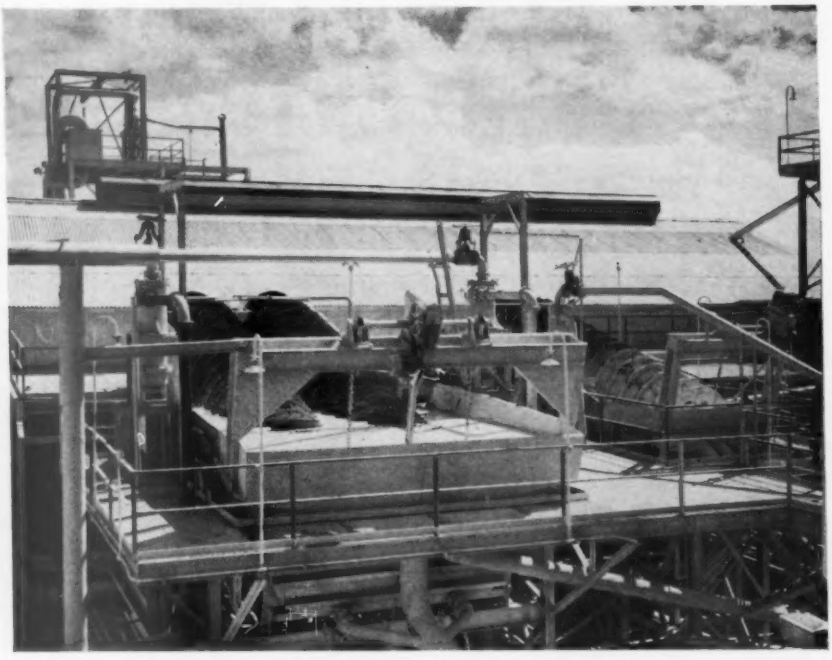
AGELESS AKINS

1934 Akins Simplex Classifier still giving Dependable Performance for Virginia-Carolina Chemical Corp.



The 78" Akins Simplex Classifier, built in 1934, is dewatering coarse feed in a special flotation circuit. The new 72" Akins Duplex Classifier, with flared tank and serrated shoes, is dewatering and desliming flotation feed. Photo shows three of more than 200 Massco-Grigsby Pinch Valves purchased by Virginia-Carolina Chemical Corporation.

Working Beside New Akins Duplex

The 78" Akins Simplex Classifier, built in 1934 for a large mining company, was acquired by Virginia-Carolina Chemical Corporation in 1956. Based on its dependable and efficient operation the company purchased a 72" Akins Duplex Classifier and a 60" Akins Simplex Classifier for its Clear Springs phosphate plant in Florida. These classifiers were sold and serviced by Mine and Smelter's Sales Agent, R. H. Clark Equipment Co., Inc., Mulberry, Florida.

"Ageless" Akins Classifiers, for washing, desliming, dewatering, size separation, and closed-circuit grinding, are available in sizes from 12" to 84" spiral diameter, simplex and duplex, with standard or submerged spiral. Sand raking capacities up to 7860 tons per 24 hours; overflow capacities up to 2386 tons per 24 hours.

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the dumping operation. There is, also, some evidence that the area on one side of the 'pour' lane contained fresh cement, leaving only the 'pour' lane for respondent's (West's) use."

Also, this higher court indicated that as West was injured prior to the start of his work shift at 8:00 a.m., and thus before he commenced to earn his pay, he was not legaly entitled to recover compensation under the State Workmen's Compensation Act from his employer. This higher court also said:

"An injured person who files a claim with the department of labor (State Workmen's Compensation Act) and who is allowed industrial insurance benefits. . . may, nevertheless, reject such benefits and initiate a common law suit for damages."

The clear legal effect of this higher court decision is that the Mount Vernon Sand and Gravel, Inc., could have avoided paying West damages for his injuries, if it had had a man to walk behind the backing motor truck to warn West of the truck's approach.

Reasonable Safety Law

It is well recognized by higher courts that if an employee is injured in the regular course of his employment, he must accept compensation specified by the State Workmen's Compensation Act. He cannot sue his employer for damages, and thereby recover a greater sum of money. On the other hand, if an employee is injured as a result of the employer's violation of a reasonable state safety law, the employee is privileged to sue his employer for damages. This is *not* the law with respect to unreasonable safety laws.

According to a late higher court decision, a state law requiring employers to provide a mechanism to disengage a machine from its "source of power" is not applicable to a bucket conveyor.

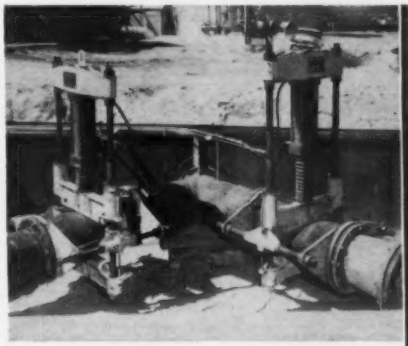
For illustration, in *State* v. *Marble Cliff Company*, 96 N. E. (2d) 297, a state law was litigated which provides that the employer must have operative means at each machine for disengaging it from the source of power by which it is operated.

The testimony showed that a

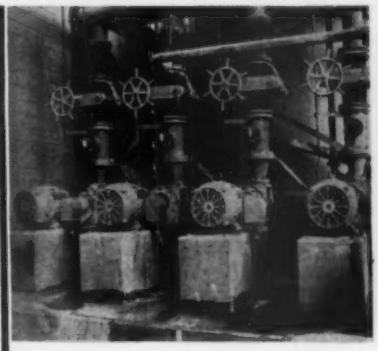
Virginia-Carolina Chemical Corp. Selects Massco-Grigsby Pinch Valves for New Phosphate Plant

200 Valves—sizes from 3" to 10"—types from handwheel to automatic operation.

Based on its previous experience with a large number of Massco-Grigsby Pinch Valves in its plants at Homeland and Clear Springs, the Virginia-Carolina Chemical Corporation purchased approximately 200 M-G valves for its new phosphate plant at Nichols, Florida. These valves were sold and serviced by Mine and Smelter's Sales Agent, R. H. Clark Equipment Co., Inc., Mulberry, Florida.



Two 12" Massco-Grigsby Hydral-Air Pinch Valves on mill tailings line at the Clear Springs Plant of Virginia-Carolina Chemical Corp. Valve system includes solenoids for remote push button control of opening and closing the valves.

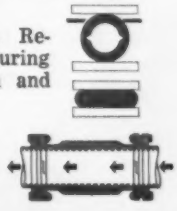


Four 6" and four 8" Massco-Grigsby Pinch Valves on the suction and discharge sides of the pumps at Virginia-Carolina Chemical Corporation's new Nichols plant.

Photo courtesy of Westinghouse Electric

Special Advantages of Massco-Grigsby Valves

- Rubber, Neoprene and special compounded rubber sleeves for corrosive and abrasive pulps and liquids.
- Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.
- Unobstructed flow eliminates high friction loss, prevents contamination.



New Automated Systems

The Massco-Grigsby Hydral-60 System consists of one or more pinch valves with a single automatically operated hydraulic pump which may be operated by electric motor or air from normal plant supply system . . . permits controlled circuitry for any operating requirement.

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corporation was engaged in the operation of a ready-mix concrete plant. An employee was on a platform above the top of the roof of the ready-mix concrete plant when he was caught in a bucket conveyor and precipitated to the ground. The resulting fractures and hemorrhages were fatal.

In subsequent litigation, the higher court held that the above state law is not applicable to a bucket conveyor of a ready-mix concrete plant.

This higher court reversed the order of the Industrial Commission which had granted a substantial award to the deceased employee's dependants, on the grounds that the employer had violated the above mentioned safety law.

Not Ordinary People

Last month a higher court rendered an important decision, and laid down new law, to the effect that if testimony indicates to a jury that a person is unusual and not normally ordinary, he cannot recover damages for a nuisance or other thing which allegedly affects the pleasurable occupancy of his home.

For illustration, in *Riblet* v. *Ideal Cement Company,* 358 Pac. (2d) 975, the testimony showed facts, as follows: A family named Riblet sued the Ideal Cement Company for heavy damages alleging that dust from the latter's plant fell and settled upon their property and dwelling, seriously affecting their general health and normal use of his property.

During the trial the court instructed the jury, as follows: "If you find that the operation of defendant's (Ideal Cement Company's) cement plant may have caused some interference with plaintiff's (Riblet's) property but that it did not cause any interference which would have been considered unreasonable by persons of normal and ordinary sensibilities under all of the facts and surrounding circumstances of the case, then your verdict should be for the defendant (Ideal Cement Company)."

In other words, the jury was instructed that if the Riblet family was comprised of persons not of "normal and ordinary sensibilities"

the Ideal Cement Company would be not liable in damages to the Riblet family.

Lawyers representing the Riblet family objected to these instructions to the jury on the grounds that the reference to normal and ordinary sensibilities was erroneous because (1) there was no evidence "that the Riblets are other than persons of ordinary and normal sensibilities; (2) the proper test of whether the Ideal Cement Company is liable in damages is how the particular persons involved would be affected."

It is important to note that there was testimony by Mr. Steiger and Mr. Erickson, neighbors immediately to the east and to the west of the Riblet property, concerning the fall of dust, and also testimony by Mr. Freund, who lived in a different direction from the Riblets and to the east of the plant. All of them testified that the deposit of dust was of minute quantity and not especially offensive. In addition, Mr. Freund testified that he suffers from bronchial asthma and is sensitive to dust of any kind, but has not been particularly troubled because of this allergy during the years he has lived in his present home.

In view of this testimony the jury decided that the Riblet family are composed of persons not of "ordinary and normal sensibilities" and therefore held that they were not entitled to recover damages from the Ideal Cement Company. The higher court approved the decision, saying:

"It would appear to the court that this evidence, in addition to that offered by John Cook, the engineer, as to the actual amount of dust falling on plaintiff's (Riblet's) property and within a mile radius of defendant's (Ideal Cement Company's) plant, raises an issue for the jury with reference to the Riblets being people of ordinary and normal sensibilities. We are in accord with the view of the trial court: that the issue was properly presented to the jury. To be sure, none of the evidence adverted to by the trial court compels one to conclude that the Riblets were not of ordinary and normal sensibilities. Nevertheless, the jury could reasonably conclude from this evidence that the Riblets's property was invaded by

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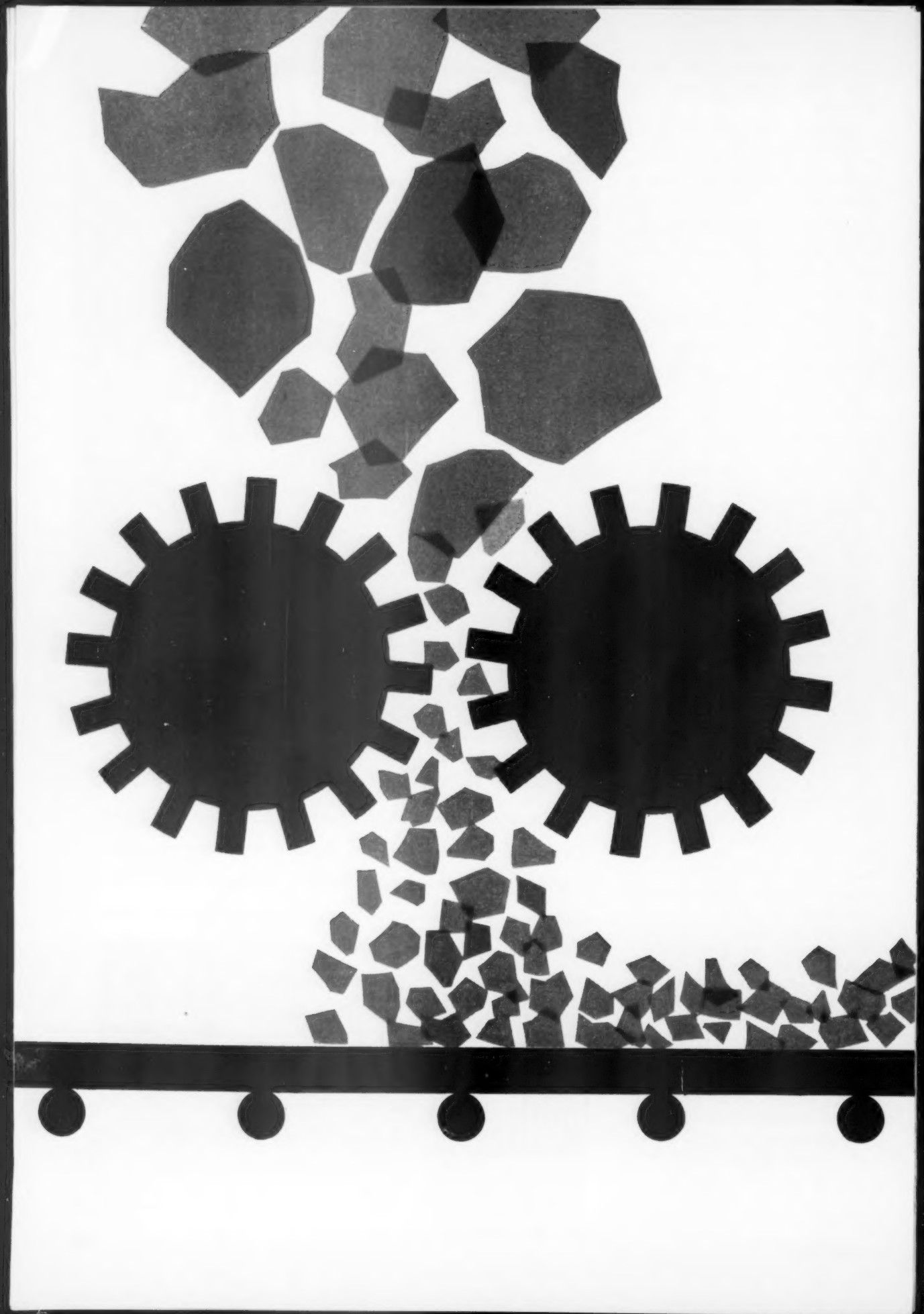

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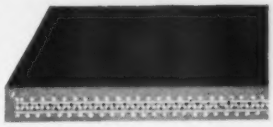

Cross section shows the heavy cotton and nylon woven construction; stranded cotton and nylon yarn in the filler for superior fastener holding and rip and edge wear resistance; nylon cord longitudinal binders for added strength.

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substantially the same amount of dust that the other people experienced, and that persons of ordinary and normal sensibilities would not have been as disturbed by it as were the Riblets."

Law on Sales-Use Taxes

Considerable discussion has arisen from time to time over the legal question: What circumstances must exist so that machinery used by a manufacturer to process salable articles are exempt from the state's sales and use taxes?

Last month a higher court held that the test of whether personal property is exempted from taxation, as property used or consumed directly in the production of tangible personal property for sale by manufacturing or processing, is not whether the items and property are essential to operation of the plant, but whether they are an actual part of the process of manufacture.

For instance, in *Ohio Company* v. *Bowers,* Tax Commissioner, 172 N. E. (2d) 295, the testimony showed that a corporation is engaged in the manufacture and sale of gray iron castings. In the manufacturing process the company uses sand molds and cores to form the castings. These molds and cores cannot be purchased on the open market and are, therefore, made by the corporation on the manufacturing premises. They are so constituted that, after they are made, the molds must be used within 12 hours, and the cores within two months. Such molds and cores can be used only once and after such use are destroyed. (The sand is then reconditioned and used in forming new molds.)

The Tax Commissioner assessed taxes on the sale and use of the machinery used by the corporation to manufacture these molds and cores.

The corporation appealed to the higher court and argued that the machinery used to manufacture the molds and cores is used directly in the production of the castings. In other words, the lawyer for the corporation urged that the manufacture of the molds and cores is a part of the manufacture of the castings.

The higher court held that the corporation must pay taxes on the machinery, saying:

"In determining whether tangible personal property is used or consumed directly in the production of tangible personal property for sale by manufacturing or processing, and therefore, whether its sale or use is excepted from the test is not whether such property is essential to the operation of an 'integrated plant,' the test to be applied being, when does the actual manufacturing or processing activity begin and end, and is the property used or consumed during and in the manufacturing or processing period. Thus, the test is not whether the property is essential to the operation of the plant, but whether it is an actual part of the process of manufacture."

The higher court also disagreed with the corporation's lawyer who contended that the machinery is exempt from state taxation because among other things the molds themselves are a part of the process of manufacturing the castings. However, to determine whether the sale or use of machinery which makes

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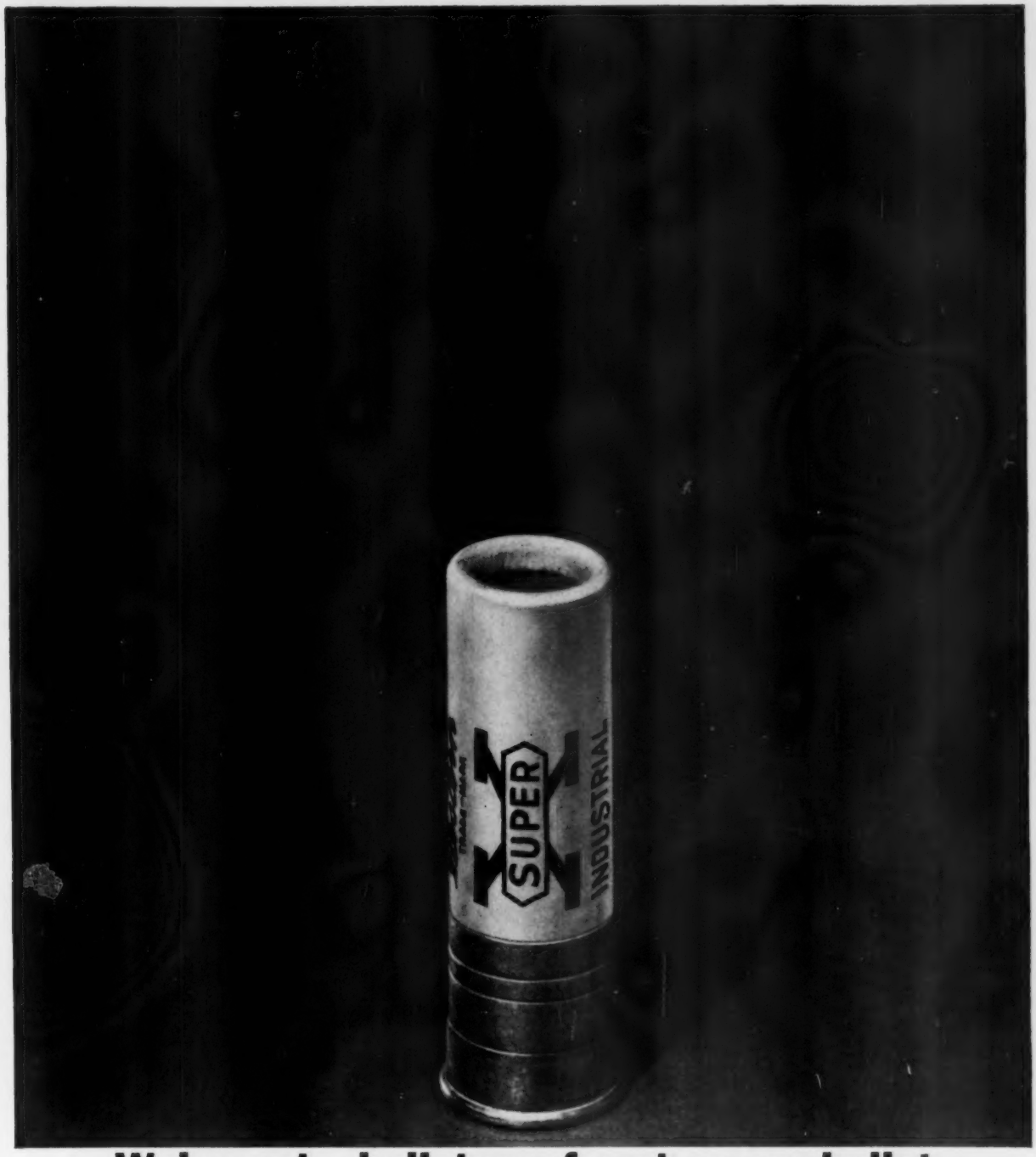

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such molds is excepted from the tax, we must look to the nature of appellant's business and the product which appellant manufactures for sale. The higher court explained that the corporation is in the business of manufacturing gray iron castings for sale, not sand molds or cores. Although the molds and cores themselves are used directly in the process of manufacturing the castings, the manufacture of the molds and cores is not a part of the process of manufacturing the castings. Essentially, as the machinery which makes such sand molds and cores is used for the carrying on of the corporation's business, such machinery cannot be considered as being used directly in the production of gray iron castings. The manufacture of the molds and cores is an entirely separate and distinct manufacturing process which, in and of itself, has no relationship to the product manufactured by appellant. In this respect, the court said:

"In the present case the machinery whose sale or use is sought to be excepted from taxation is used to manufacture what are essentially tools which are used subsequently in the manufacturing process."

This higher court went on to explain that if the corporation were engaged in selling molds and cores the machinery would be exempt from state taxation. However, as the machinery was not utilized to manufacture and process the castings, which the corporation sold, the machinery was not exempt from taxation.

Actually the origin of this new decision stems from the higher court case of *General* v. *Bowers,* 159 N. E. (2d) 739. In that case a corporation sought to have exempted and excepted from taxation machine tools and equipment used for the building and maintaining of dies, etc., for the stamping of panels. Chief Justice Weygandt, in the opinion, stated:

"Restated and reduced to its lowest terms, the question before this court is whether the statutory sales and use tax exceptions are applicable to tools purchased and used for the manufacture of other tools which in turn are later used directly in the manufacture of panels to be sold by the appellant (corporation).

"To so hold would constitute a disregard of the plain meaning of the word 'directly' which the dictionaries define as 'without the intervention of a medium or agent.' It would seem beyond cavil that the manufactured tools are an intervention between the purchased tools and the final panels."

The court in its syllabus stated: "Such sales and use tax exceptions are not applicable to tools purchased and used for the manufacture of other tools which in turn are later used directly in the manufacture of chattels."

Law of Hazardous Injuries

A higher court has rendered an important decision which clarifies the often asked legal question: If an employee's duties are partly manual and mechanical in a business defined as hazardous by the State's Workmen's Compensation Law, is such employee covered and

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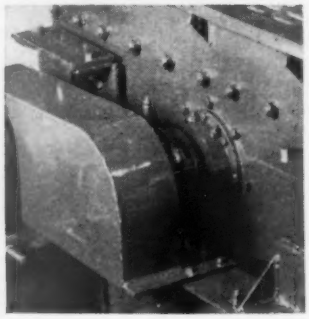

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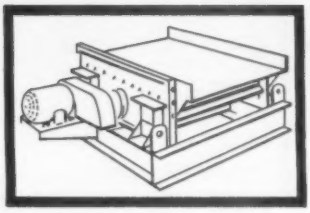

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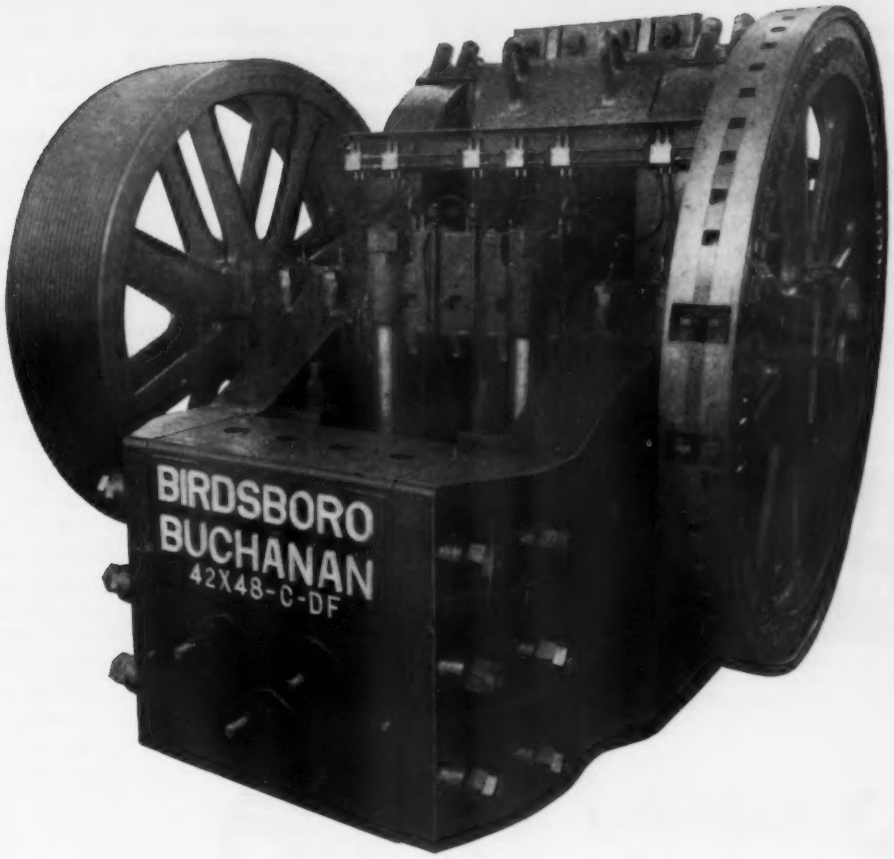

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protected by the Act, even though his work may be performed under conditions not inherently hazardous?"

For instance, in *Baldwin-Hill Company* v. *Lochner*, 359 Pac. (2d) 228, the testimony showed these facts: A state law provides that compensation shall be paid employees who are injured when performing hazardous work. Further testmony showed that the Baldwin-Hill Company has two plants and is engaged in the manufacture and sale of rock wool insulation. An employee, named Lochner, acted in the dual capacity of a sales and production manager. Lochner maintained an office and exercised supervisory functions over administration, production, and management. The duties of Lochner's employment required him to travel to two plants and over an assigned sales territory.

Lochner was killed in his automobile while en route to his employer's plant when he collided with a train at a crossing.

It was argued that Lochner's dependents were not entitled to recover compensation under the State Workmen's Compensation Act because when Lochner met with the accident he was not then performing any work defined by the state statute as hazardous.

It is interesting to observe that the higher court awarded Lochner's dependants compensation, saying:

"The right to benefits under the Workmen's Compensation Act is not governed or determined by the specific act performed by employee (Lochner) at the time of the injury for which compensation is sought, but by the nature of his employment. In the instant case, the evidence is undisputed that decedent (Lochner) did perform duties at both plants where he ran laboratory tests and personally inspected the phases of production. While on sales promotion trips in his district, he was required to assist the customers 'on the job sites' with adjustment of power equipment used in applying rock wool insulation."

City Manager Not Liable

According to a late higher court decision a city manager is not liable for damages caused private citizens and property owners by negligent performance of his executed duties. This rule of law also is applicable to eminent domain proceedings.

It is generally well known that eminent domain is the right to take private property, such as sand and gravel deposits, for public use without the owner's consent, upon payment of just compensation. The right is an inherent power of sovereignty, came into being with the establishment of government, and continues as long as government endures.

While a municipal corporation has no inherent power of eminent domain the legislature of various states has delegated that power to all cities "to condemn private property or easement therein for the use of the city for any purpose whatsoever," G. S. 1949, 26-201. Likewise, the legislature has empowered cities to abandon an eminent domain proceeding (G.S. 1949, 26-206) if the governing body deems the city aggrieved by the appraisement, assess-

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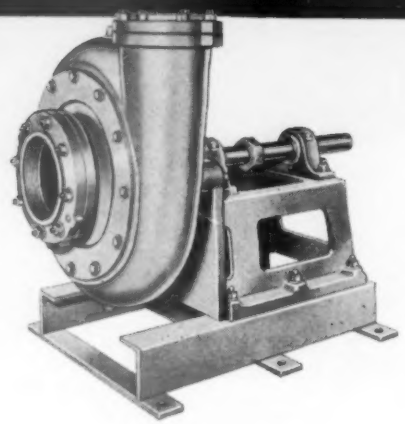

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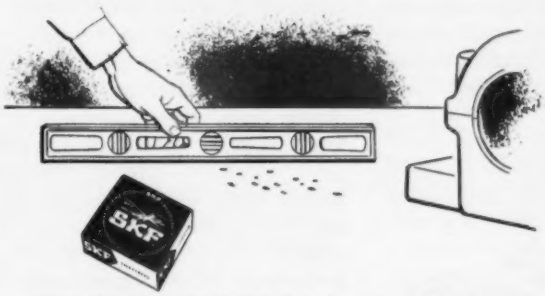
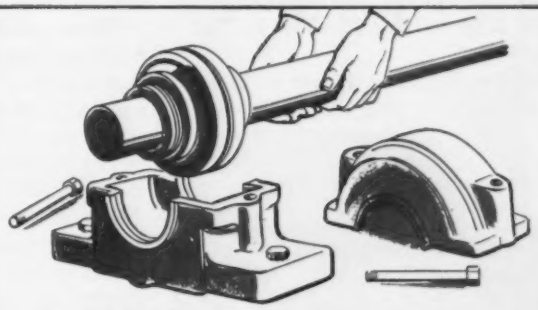
DISTRIBUTOR DAN, the SKF bearing man, says:

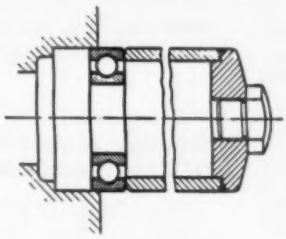
"TEAR OUT THIS PAGE AND READ IT BEFORE YOU INSTALL A BEARING"



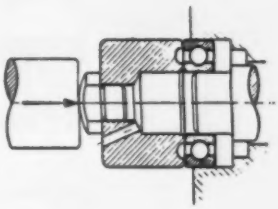
CHECK THE HOUSING SUPPORT first, for surface flatness and horizontal alignment. Then check the housing for correct position. Both checks are vital if you have to mount a non-self-aligning bearing in an independent housing.



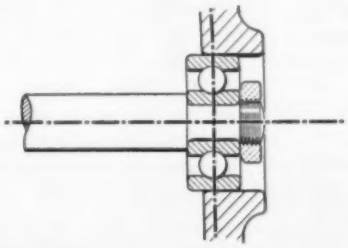
WITH SPLIT HOUSINGS, you simply lower shaft and bearing into the bottom half. Then secure the top half. Straight-through solid housings use bearings with rings that fit loosely with the housing, enabling you to push shaft and bearing into position.



BEARINGS THAT FIT LOOSELY on the shaft generally have a tight fit in the housing. In this case, mount the bearing in the housing by knocking on a mounting sleeve or by pressing. Then insert the shaft into the bearing.



BEARINGS WITH TIGHT FITS on the shaft and in the housing are usually mounted by fitting both rings simultaneously. Apply force to both rings but make sure it isn't carried to the rolling elements. Make sure the mounting sleeve and rings are flush.



START IT SQUARE. When you install a bearing in a solid housing, make sure the bearing is square with the shaft. If it enters obliquely, the more you try to seat the bearing the more trouble you'll have in moving it.

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ment of damages or award of the commissioners, by the adoption of a resolution within ten days after the filing of the commissioner's report. (*State* v. *Nelson,* 126 Kan. 1, 266 P. 107; *State* v. *Boicourt Hunting Ass'n,* 183 Kan. 187, 326 P. 2nd 277; *Board of Park Commissioners of City of Wichita* v. *Fitch,* 184 Kan. 508, 518, 337 P. 2nd 1034).

For instance, in *Weast* v. *Budd,* 349 Pac. (2d) 912, these facts were proved: A city and its manager, named Budd, commenced an eminent domain proceeding to condemn Weast's 100 acres of lands for public purposes. Budd met with Weast and the commissioners at that time.

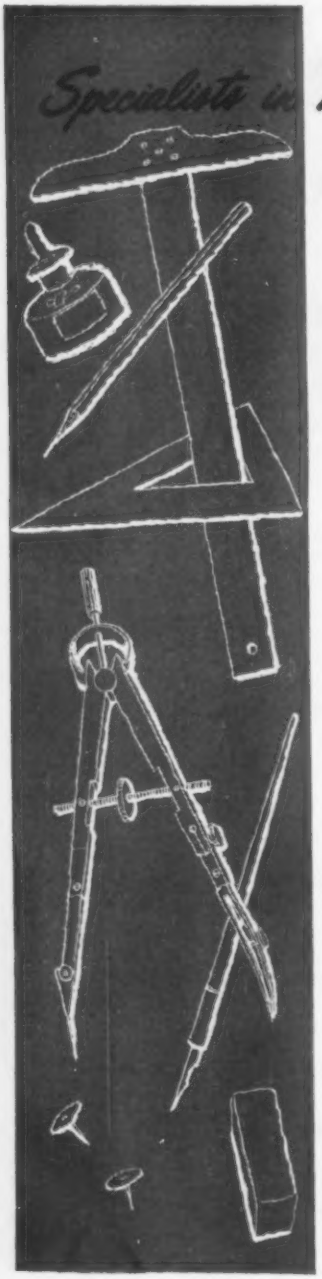
Later the city and Budd abandoned the eminent domain proceeding.

Weast sued both the city and Budd for heavy damages and proved that he was told, informed, instructed, and directed by Budd that the city would take his land. Weast relied upon Budd's representations and immediately removed himself, his family and equipment from the land.

Weast asked the court to award him $25,000.00 for loss of business profits.

The higher court refused to hold either the city or Budd liable in damages to Weast, and said:

"Since the power of eminent domain is an inherent power and springs from the necessity of government, it is exercised by a municipal corporation only as a governmental power or function, irrespective of the purpose for which the property acquired for public use is to be put. In the classification of powers, the duties exercised by the city managers are administrative or executive and are governmental or discretionary as distinct from being ministerial in the performance of his duties he is immune from personal liability by reason of negligence or misconduct."



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Schirmer Named Vice-President Of Clark Equipment Company

WALTER E. SCHIRMER has been elected executive vice-president of Clark Equipment Company, Buchanan, Mich.,

Mr. Schirmer, a member of the Clark Equipment organization for 24 years, has been vice-president since 1947. In addition, he has been president of Clark Equipment International, C. A. since 1958. In this latter capacity, he has been responsible for Clark operations, including sales, manufacturing and service, in major overseas marketing areas throughout the free world. He was elected to the Clark board of directors in 1960.

As executive vice-president, Mr. Schirmer will assist GEORGE SPATTA in the over-all management of Clark Equipment Company. His efforts will be directed to both domestic and international operations. The executive vice-presidency has been vacant since Mr. Spatta was elevated from this position to the presidency in 1945.

A graduate engineer and a lawyer, Mr. Schirmer joined Clark Equipment Company in 1937 as head of the company's legal department.

Manufacturers' News

P. C. MITCHELL and J. C. WILLEY have been elected to the board of directors of Harbison-Walker Refractories Company, Pittsburgh, Pa.

Mr. Mitchell has been vice-president, mining, at Harbison-Walker since 1953. He began with the company at the Clearfield, Pa., No. 1 Works in 1922.

Mr. Willey has been assistant to the president and managing director of the company's Peruvian subsidiary, Refractorios Peruanos, S.A. He succeeds his father, RAYMOND WILLEY, who retired after serving as director for 44 years. Mr. Willey began his career with Harbison-Walker in 1934, joining the Clearfield works, after graduating from Princeton University.

BYRON H. PYLE, president of the Kennedy Van Saun Manufacturing and Engineering Corporation, New York, N.Y., announced recently that controlling interest in the firm passed to the McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans., effective May 19.

McNally Pittsburg is purchasing, for an undisclosed amount, the common stock held by Mr. Pyle and surviving members of the family of the late JOSEPH E. KENNEDY, founder of the firm. The cash transaction did not involve an exchange of stock nor outside financing.

MAURICE SHAFER, presently executive vice-president, will become president of the firm upon the retirement of Mr. Pyle. He has been employed by Kennedy Van Saun since 1929.

EDWARD T. MCNALLY, president of the McNally Pittsburg Mfg. Corp., will become chairman of the board of directors of the Kennedy firm. Other officers in the firm will continue in their present posts. No changes in operating personnel are contemplated. Sales and engineering activities in New York and manufacturing in Danville, Pa., will be continued.

● A mobile welding laboratory and classroom for demonstrating improved techniques of hard surfacing by welding, and selection of the best wear resistant alloys for each type of application has been introduced by Alloy Rods Company, York, Pa.

The entire unit is housed in a custom built trailer, and includes a sealed-off welding lab and a classroom with 12 desks and chairs. A projector for slides, a screen, and a blackboard are also built in. The trailer will tour the country, visiting quarries and similar industrial users of hard surfacing materials, and will also visit distributors.

FOR THE CONTROL OF ROCK, ORES, ETC.
TO CRUSHERS, CONVEYORS, ETC.

ROSS CHAIN FEEDERS

ROSS DROP-BAR GRIZZLY FEEDERS

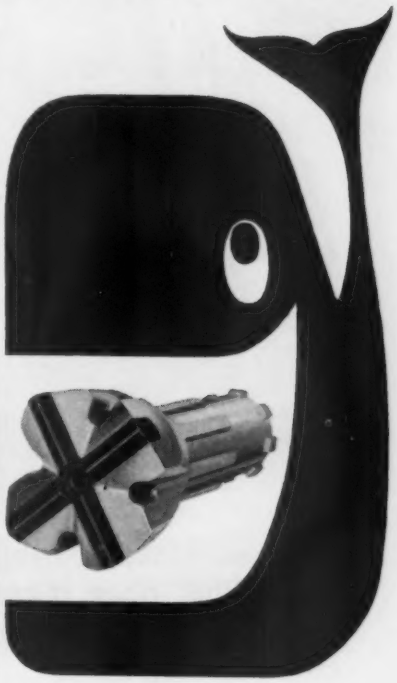
ROSS SCREEN & FEEDER CO.
100 Quimby Street
WESTFIELD, N. J.

ROSS ENGINEERS LTD.
11 Walpole Road
SURBITON, SURREY, ENGLAND

CANADIAN LICENSEE: DORR-OLIVER-LONG LTD. ORILLIA, ONT.

Enter 235-A on card, page 241

A WHALE OF A ROCK APPETITE



BRUNNER & LAY SPLINE ROK-MASTER

Wherever widely spaced, large diameter blast holes can be used these 4½"; 5", 6", 6½"; 7" and 9" Brunner and Lay Spline Rok-Master bits will produce sensational results. They simply extend the proved economies of all Brunner & Lay carbide bits to larger hole sizes. They give the Brunner & Lay line complete coverage of all drilling tools from chuck to muck. Pit them against those you now use, you'll wish you had sooner.

Brunner & Lay, Inc., 9300 W. King St., Franklin Park, Ill. Plants & conversion shops from coast to coast.

Brunner & Lay

CARBIDE ROK-BITS • DRILL RODS • INTRASET STEEL COUPLINGS • ADAPTERS EXTENSION STEEL • STRIKING BARS • ETC.

Enter 235-B on card, page 241

Du Pont reports on

a new type of conveyor belt carcass

that sets new standards of performance

Made with load-bearing components of DACRON® fiber, it resists deterioration better, carries more, cuts handling costs

Today, a new type of conveyor belting offers you cost-saving performance on the toughest jobs in industry. The reason is a fabric carcass made with strong reinforcements of "Dacron"* polyester fiber running the length of the belt.

Superior resistance to deterioration—"Dacron" is not affected by rot and mildew, so these belts do not have problems with moisture in cover cuts, or when fabric is exposed in the splice area. "Dacron" also withstands belt-fastener rust and most chemicals to assure long service under tough, wet or dry operating conditions.

Improved durability—Impact resistance is excellent. The high strength of "Dacron" teams up with the strength and elasticity of nylon, the cross fiber, to sustain shock loads. "Dacron" resists stretch. This means lower growth of the belt in service—fewer take-ups.

Better flexing and troughing—Because of this high-strength carcass made with "Dacron", these belts can be thinner, permitting the use of smaller-diameter pulleys. They are more flexible, train better on idler rolls—resulting in less belt wander and edge wear. These belts have a better resistance to flex failure—an important long-life feature.

Troughing up to 45° is possible, compared to the usual 20°. This means belts can be narrower and lighter—and still carry larger loads. The result is reduced handling costs right down the line!

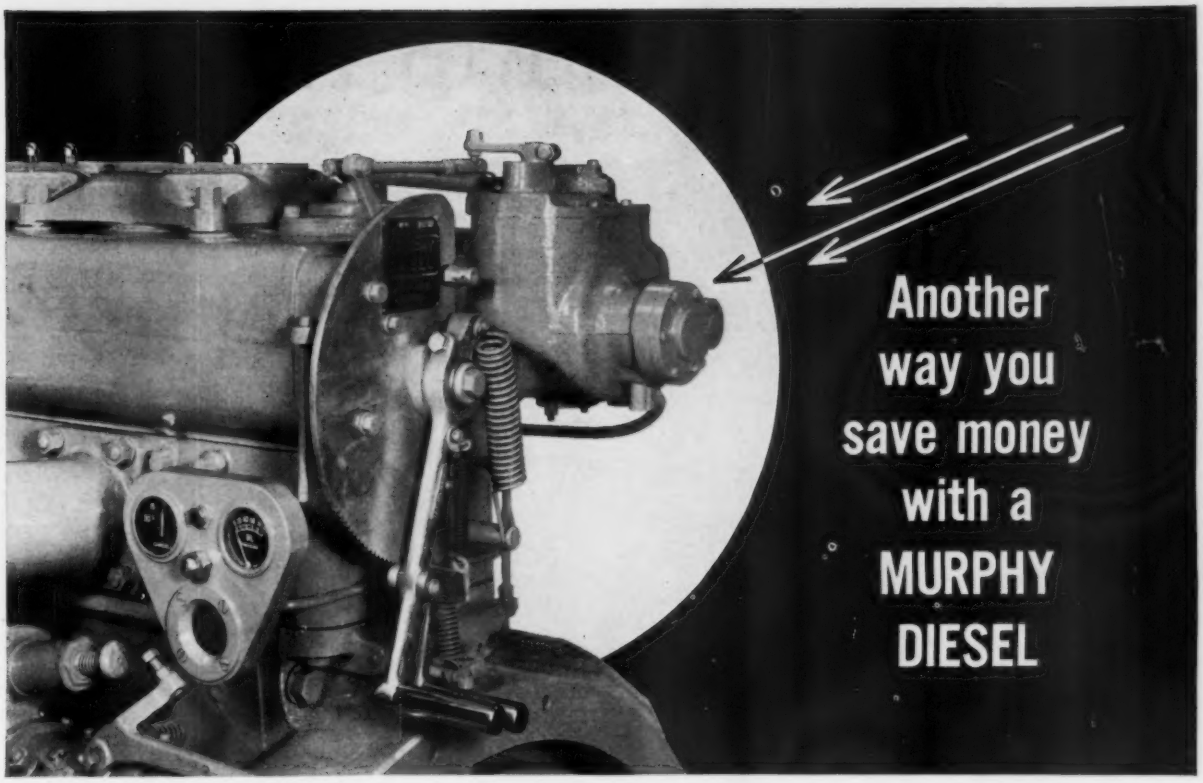
More for your belt dollar—It all adds up to superior performance and the economy of long service with fewer belt replacements, less down-time, lower maintenance costs. Make sure you ask about conveyor belts made with "Dacron" polyester fiber next time you order—get the most for your belt dollar!

E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Dept., 191 South Main St., Akron 8, Ohio.

*Du Pont's registered trademark for its polyester fiber.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

DACRON® *polyester*
the conveyor belt fiber



HYDRAULIC SERVO-TYPE GOVERNOR pays off in profit

assures instant response to load change
protects engine from damage

One diesel engine characteristic of prime importance to your operation is the ability to respond *instantly* to varying loads, as well as assure accurate speed control for steady loads. Murphy's Hydraulic Servo-Type Governor utilizes lube oil pressure to adjust injector controls for precise, immediate response throughout the engine's speed range, from idling to full speed. This type of control assures better combustion at all times to save you fuel dollars. It minimizes abnormal operating conditions that cause excessive wear.

An important safety feature . . . If lube oil pressure drops below a safe level, the governor automatically shuts off the engine, protecting it from possible damage.

The Hydraulic Servo-Type Governor is one of many exclusive Murphy design features. Ask your Murphy Diesel Dealer to explain the combination of features that make Murphys first choice for dependability and economy.

OTHER MONEY-SAVING MURPHY FEATURES

UNIT FUEL INJECTORS precisely control fuel injection, permitting "true" diesel operation. Starting is easier and operation smoother.

PLAIN, OPEN COMBUSTION CHAMBERS assure *complete* combustion for maximum power from each drop of fuel with less engine wear.

FOUR VALVES PER CYLINDER have greater breathing capacity and permit higher power output. Because they run cooler, valves rarely have to be ground.

Murphy Diesel MP Series engines and power units, 105 to 420 HP; generator sets, 70 to 227 KW; dual fuel engines, 147 to 242 HP; marine engines, 105 to 420 HP.

MURPHY DIESEL ENGINE FEATURES MEAN MORE PROFITABLE OPERATION

MURPHY DIESEL

MURPHY DIESEL COMPANY

5307 W. Burnham St., Milwaukee, Wisconsin

SALES . . . PARTS . . . SERVICE

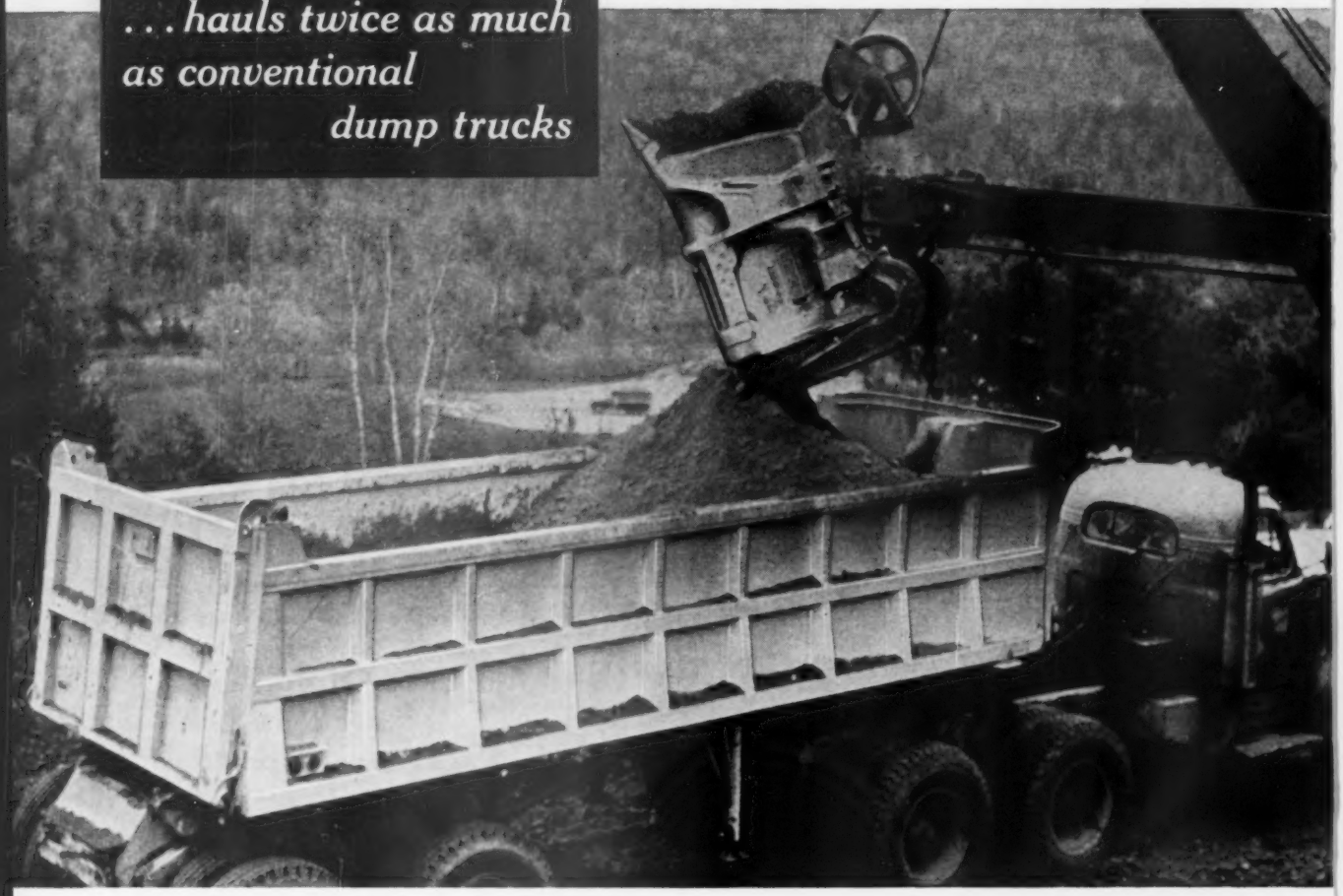
Throughout the Nation

419-RO

IN ROUGH TERRAIN—

HEIL-TEC Dump Trailer

. . . hauls twice as much as conventional dump trucks



In extremely rough terrain, this specially designed 20-yd, 18-wheel HY-SPILL frameless dump trailer hauled approximately *twice* the payloads that comparative 10-wheel dump trucks carried at about the same speed.

This outstanding performance was achieved for Landers & Griffin, Inc., Portsmouth, N. H., on their job in the heart of the White Mountains near Littleton, N. H.

"It is only because of the remarkable stability of the HY-SPILL design, along with the flotation of 18 tires and the traction of two axles, that such performance is possible," said a spokesman for Landers & Griffin. "If this was attempted with a conventional frame trailer, repeated tip-overs would be the result."

TEC offers unsurpassed know-how in dump trailer design. Every TEC unit is engineered for the kind of applications you specify and for the area where it will operate. Choice of single-axle and tandem semi-trailers for use with either single-axle or tandem tractors. Single-axle trailers are available in body lengths from 16 to 28 ft, and tandem-axle units in lengths from 20 to 34 ft.

HY-TEC FRAMELESS TYPE
U.S. Patent No. 2,846,267

HY-SPILL FRAMELESS TYPE
(Available Only From Heil)
U.S. Patent No. 2,853,341

Other on-the-job advantages of TEC design

- Exclusive HY-SPILL design holds front tandem wheels on ground while dumping . . . provides 38- to 40-in. spill height from end of body floor to ground for dumping into high hoppers, paving and spreading machines.
- Body can be raised or lowered while moving, with better stability than any other hauling unit.
- Trailer can be dumped while jackknifed, speeds dumping and turn-around in tight places.
- Exclusive design of TEC frameless dump trailers cuts dead weight . . . lets you haul up to 4,000 lb more payload — even more where longer axle spacing is desirable or when aluminum bodies are used.

TEC Division THE HEIL CO.

DUMP BODIES and HOISTS

TEC Division, 1285 West 70th Street, Cleveland 2, Ohio

Clupak extensible paper is being made in Japan under a licensing agreement between Clupak, Inc., and the Chuetsu Pulp Industry Co., Ltd., according to an announcement from G. E. AMERMAN, president of Clupak. FRED S. BREELAND, Clupak field engineer in Japan, is supervising the start-up and the training of the paper mill crews.

HOWARD C. SHEPERD was elected chairman of the board of directors of Atlas Copco, Inc., at a recent meeting of the board.

PETER REDPATH was named president at the same meeting. Formerly vice-president, sales, for Canadair, a subsidiary of General Dynamics, Mr. Redpath retired from this position in December, 1960, but continues as consultant to this organization. He has been associated with Atlas Copco through his directorship in Atlas Copco Canada.

Atlas Copco, Inc., was formed at the beginning of the year by merging Atlas Copco Eastern, Paramus, N.J., and Atlas Copco Pacific, San Carlos, Calif.

C. E. BURTON, formerly vice-president of Atlas Copco Pacific, has been named executive vice-president for the new organization, and will continue to operate from the San Carlos office.

R. G. CHAMBERS has been appointed vice-president in charge of the Eastern Division. He comes to the United States organization after 10 years with Atlas Copco Canad..

Atlas Copco, Inc., is a member of the world-wide Atlas Copco Group, with headquarters in Stockholm.

KENNETH R. GEIST has been named general manager of the newly formed special products department, Allis-Chalmers Mfg. Co., Milwaukee, Wis. In this capacity he will develop new businesses for the company.

Mr. Geist became an employee of Allis-Chalmers in 1941 when he joined the company's graduate training course. He received a bachelor of arts degree in 1939 from St. Olaf College and a master of science degree in metallurgy in 1941 from the University of Minnesota.

The promotion of five employees was recently announced at Barber-Greene Company, Aurora, Ill.

EDWARD H. FAUTH becomes director of engineering; JAMES H. RICE, new product and marketing coordinator; JAMES E. GLEASON, newly appointed manager of the company's Conveyor Division; PHILIP J. HANSON, new manager of the Industrial Applications Division; and RICHARD C. GRAFFAGNA, manager, dealer conveyor marketing.

Construction plans for a new 200,000-sq. ft. plant at Houston, Tex., were announced by Bemis Bro. Bag Company, St. Louis, Mo. The plant will manufacture paper, textile and open-mesh bags.

The new one-story facility will occupy an 18-acre site in northwest Houston. Ground will be broken in late spring, with completion anticipated for late fall and full operation scheduled by the end of the year. Cost will approximate $1.4 million, excluding machinery, etc.

WILLIAM V. SPURLIN has been named vice-president and chief engineer for Syntron Company, Homer City, Pa. Mr. Spurlin came to Syntron in 1946 as development engineer, and was named chief engineer in 1958.

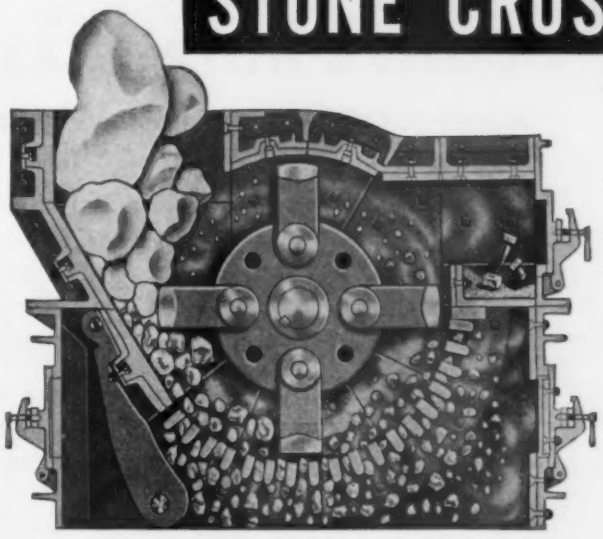
He fills the vacancy created by the retirement of E. J. MISSIEN, who had been vice-president in charge of engineering.

GERALD W. JENSEN, who joined Denver Fire Clay Company, Denver, Colo., as executive vice-president in October, 1960, has been named president of the company. Mr. Jensen succeeds RICHARD C. SHEPARD, who will continue as chairman of the board.

Other officers elected at this time are JAMES T. RUTHERFORD, vice-president of manufacturing, and J. H. LENTZ, vice-president of sales, both of whom joined the company in October, 1960. J. H. LENTZ, who has been with the company for 25

(*Continued on page* 245)

American MODEL ACS
STONE CRUSHERS

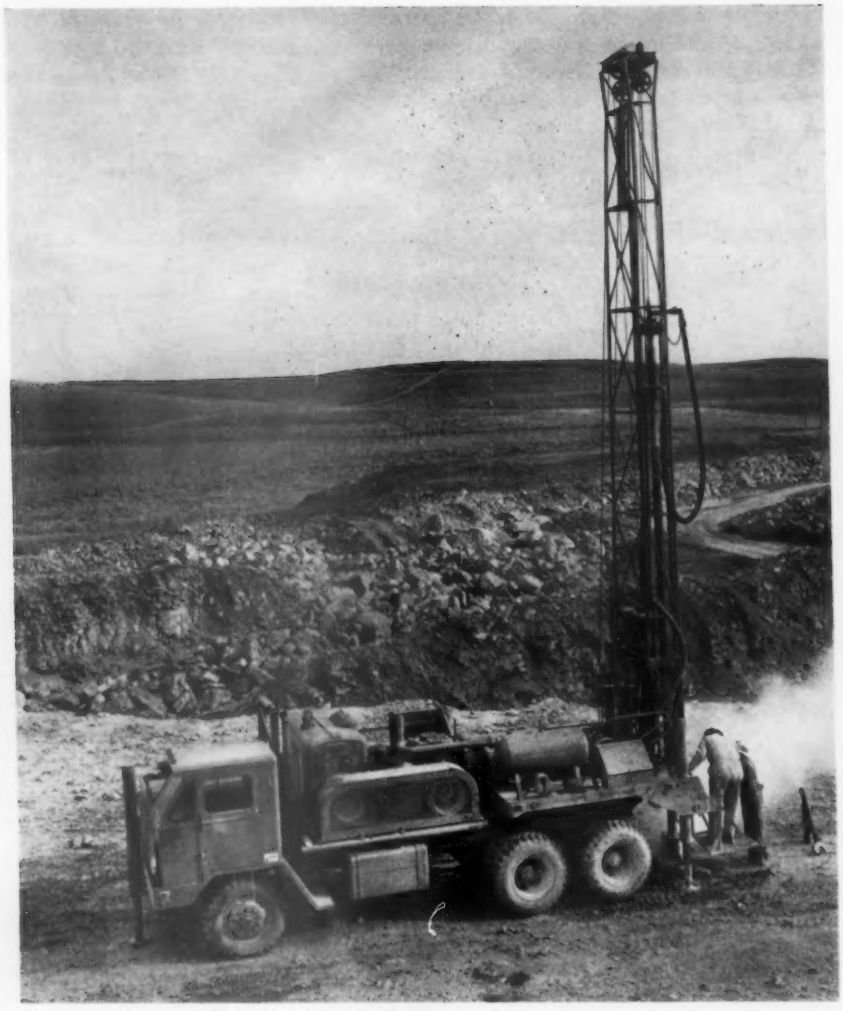


- Capacities up to 250 tons per hour
- Ruggedly built for extra heavy duty service
- Manganese steel liners, breaker plates, hammers and grate bars
- Wide range of reduction ... low-cost operation

Write today for literature! "Better Stone Crushing"

American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1059 MACKLIND AVE. ST. LOUIS 10, MO.

Enter 239 on card, page 241



HUGHES *ROTA-BLAST* BITS
are engineered for mining

Type **HH**
ROTA-BLAST
Formerly type RG-2JS
for extremely hard
abrasive rock
(Taconite, quartzite)

Type **H**
ROTA-BLAST
Formerly type W7R
for hard rock
(Siliceous limestone,
dolomite, sandstone,
granite)

Faster blast-hole drilling means more production, lower costs. In areas where blast hole drilling is the toughest, Hughes "Rota-Blast" rock bits and rotary drilling techniques, developed in close co-operation with operators and drill manufacturers, are increasing footage and penetration rate as much as 100% and more.

Your Hughes representative can recommend the "Rota-Blast" bit best suited to your operation, and is also qualified to offer you assistance in your drilling program. Back of his recommendations are more than a half-century of specialized rotary rock bit experience, and the world's largest rock bit manufacturing plant.

HUGHES®
industrial products
HUGHES TOOL COMPANY • HOUSTON, TEXAS

Type **M**
ROTA-BLAST
Formerly type OW
for medium rock
(Limestone, sandstone,
sandy shales)

Type **S**
ROTA-BLAST
Formerly type OSC-1G
for soft formations
(Calcite, shale, clay)

more information, please

Use postcard to receive literature or details on new equipment and products reported in this issue.

THE COLUMBIA 18 x 36 CEDAR RAPIDS TWIN MOVABLE JAW made of manganese steel, is described in a folder published by *Columbia Steel Casting Company*. Information includes weight, tooth depth, over-all thickness, drawing number, etc. **(301)**

HYDRAULIC-POWERED DRILL RIGS, TOOLS, and accessories manufactured by *Mobile Drilling, Inc.*, are covered in an illustrated 80-page catalog. Over 1,900 items related to rotary drilling and soil exploration are detailed. Other features are a water-air selector table that gives the correct g.p.m. of drilling fluid or c.f.m. of air required for rotary sampling and coring and the preface to the sample tool section which explains the techniques of subsurface exploration. The nine section book is cross-indexed for easy reference. Catalog 615 is available from Mobile distributors or by letterhead request. **(302)**

BUCKET ELEVATORS FOR HANDLING FREE-FLOWING bulk materials are detailed in a bulletin released by *Barber-Greene Company*. Types available include standard enclosed vertical, positive-discharge, open inclined, and super-capacity. Included are data on both centrifugal-discharge and continuous elevators, a section on selection of the proper type of elevator for a specific application, and a selection table showing recommended elevators for over 80 materials. **(303)**

THE FULL LINE OF TRAXCAVATORS, wheeled or track type, is set forth in an illustrated pamphlet published by *Caterpillar Tractor Co.* Specifications and capacities are included. **(304)**

INGENIOUS USES OF MANUAL AND AUTOMATIC ARC WELDING are demonstrated in "Hobart Arc Welding News," available free from the *Hobart Brothers Company*. **(305)**

PORTABLE CRUSHERS manufactured by *Gruendler Crusher & Pulverizer Co.* are presented in two bulletins from the company.
PORTABLE PRIMARY crushers are described in Bulletin No. BR-35-1A. Jaw sizes range from 15 x 24 in. to 24 x 36 in. Capacities range from 40-60 t.p.h. (2½-3½ in.) to 80-160 t.p.h. 3-5 in.).
PORTABLE SECONDARY crushers are set forth in Bulletin BR-35-1B. Several sizes are offered for use with hammermill, roll, or jaw crusher, depending on material, location and size aggregate desired. Capacities range from 30 to 140 t.p.h. **(306)**

THE NONCLOG TORQUE-FLOW PUMP offered by *WEMCO*, a division of Western Machinery Company, is described in a folder. The pump is nonclog, abrasion resistant, yet handles delicate materials without damage. **(307)**

JULY ***PIT AND QUARRY*** ***1961***

Insert key numbers found below items on advertising, literature, and new equipment pages. Print company name if not keyed.

Void after 60 days.

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

We produce _____

FIRST CLASS
PERMIT NO. 44
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

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Pit and Quarry Publications
431 South Dearborn Street
CHICAGO 5, ILL., U.S.A.

more information, please

Use postcard to receive literature or details on new equipment and products reported in this issue.

CARBIDE-TIPPED PERCUSSION BITS for all types of rock drilling, quarrying, and open-pit mining are set forth in a catalog issued by *Vascoloy-Ramet Corporation*. Charts contain data to aid in selection. The line includes bottoming and shoulder bits in all popular threads, down-the-hole bits for splined or API thread connections, and push-on style bits. All are available in a range of diameters. **(308)**

"A GUIDEBOOK TO AUTOMATION for the Cement Industry," a brochure published by *General Electric*, explains the automation ring, automation in practice, and its application to quarrying, crushing, burning, storage, grinding, and related subjects. **(309)**

"B&W INSULATING FIREBRICK," Bulletin R-38, released by the Refractories Division of *The Babcock & Wilcox Company*, discusses the advantages of insulating firebrick and offers charted information on a wide variety of applications. Drawings offer simple solutions to complex design problems. Also included are basic application and selection data, such as heat loss and storage tables. **(310)**

SLEEVE BEARINGS IN FLANGED AND PILLOW BLOCK types are described in a 6-page folder offered by *Link-Belt Company*. The self-aligning, self-lubricating blocks reportedly operate to temperatures to 1,000 deg. F.; in corrosive and contaminating conditions; in inaccessible locations where lubrication and maintenance are problems; where noise control is important; at slow speeds; and even under water. **(311)**

FOUR-WHEEL LOADERS manufactured by *J. I. Case Company* are depicted in a 16-page brochure, published by the company. Performance and application information is readily accessible. **(312)**

AUTOMATIC BULK WEIGHING SYSTEMS are described in an illustrated folder released by Toledo Scale, division of *Toledo Scale Corporation*. Advantages of the systems are reported to be: net weight loading of carriers; immediate printed weight records; preset draft counters which allow predetermination of the number of drafts processed in sequence; net weight totals and sub-totals available on remotely located control consoles; and positive "fail-safe" circuitry. **(313)**

MINING AIR TOOLS manufactured by *Thor Power Tool Company* are detailed in 48-page catalog No. 46. Diagrams show tool features and specifications are given for each model shown. **(314)**

Material listed here is FREE unless otherwise noted.

FIRST CLASS
PERMIT NO. 44
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

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Pit and Quarry Publications
431 South Dearborn Street
CHICAGO 5, ILL., U.S.A.

NEW SUBSCRIPTION ORDER FORM

Send PIT AND QUARRY to me for

____One Year $3* ____Two Years $5 ____Three Years $6

____Payment enclosed ____Bill me ____Bill company

Name _____ Title _____

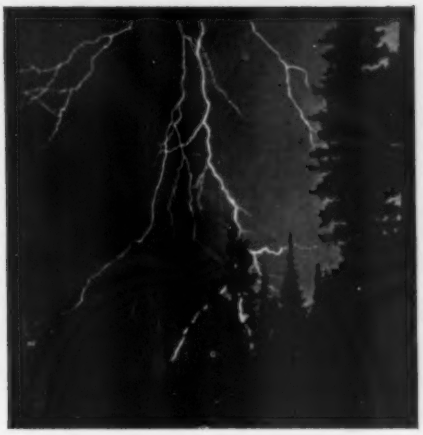
Company _____

Address _____

City _____ Zone _____ State _____

Type of business and products _____

*U. S., U. S. Possessions, and Canada only.
Pan American countries, $10 a year; elsewhere, $15 a year.



Primacord®

your safest method of initiating explosives whenever stray electric currents may be encountered

This well-recognized hazard is minimized when Primacord Detonating Fuse is used – as the initiator *throughout* the blast.

Primacord cannot be detonated by extraneous electric currents . . . *minimizes the possibilities of premature detonation* from such causes. On at least one occasion, a Primacord trunkline failed to detonate when struck by lightning! This is one important reason why more and more blasters are adopting Primacord for open pit and construction projects . . . and for underground operations. Because of exposure time, Primacord is of particular importance when holes must be preloaded.

But *when you are ready to blast*, Primacord detonates at almost four miles per second. It has a minimum initiating strength of a blasting cap along its entire length. Primacord is relatively insensitive. It cannot be set off by sparks – or by normal vibration, friction or shock. It has the added advantage of being simple, easy and economical to use.

A Primacord downline saves time and labor costs when loading; simplifies multiple priming and deck loading operations. As a trunkline, it will connect all holes for instantaneous or surface delay initiation. Primacord is available in a number of standard and special types developed to meet varying needs. For further information, consult your explosives manufacturer or write

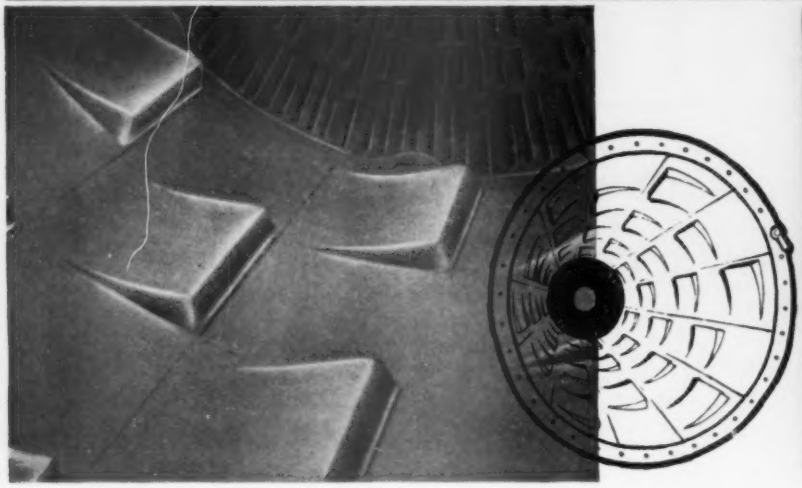
THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut • *Since 1836*
THERE IS A TYPE OF PRIMACORD® FOR EVERY TYPE OF BLASTING

E-B

Free! NEW GUIDE AND CONDENSED MANUAL: "PRIMACORD DETONATING FUSE . . WHAT IT IS . . HOW TO USE IT." ASK YOUR EXPLOSIVES MANUFACTURER OR WRITE US GIVING YOUR COMPANY NAME.

TREADWELL LINERS

are built to take the toughest punishment a BALL, ROD OR TUBE MILL can give



You tell us your liner requirements and our qualified metallurgists will recommend the alloy and treatment that will do the best job. Treadwell experience covers the complete range for meeting any requirement in grinding cement or any other material.

300 M STEEL
New type alloy steel of ultra high strength. Brinell 450-550 gives high abrasion resistance. Photograph shows 300 M staggered design lining in mill.

CHROME MOLYBDENUM STEEL
Used in large diameter mills with severe impact conditions, Brinell 425-500.

NI-HARD
Recommended where Brinell 500-600 is desired and moderate impact conditions prevail.

TE TREADWELL
ENGINEERING COMPANY · EASTON, PA

SALES OFFICES:
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208 S. LA SALLE STREET, CHICAGO 4, ILL., CEntral 6-9784

STEEL MILL EQUIPMENT

Manipulators, Mill, etc.
Mills, Billet, Merchant & Bar
Mills, Rod
Mills, Vertical Edging
Mill Repeaters
Coilers & Reels
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers
Conveyors, Coil
Drivers & Pinions
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Cooling
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Handling Equipment (Kick-offs, Pliers, Cradles, etc.)

SPECIAL MACHINERY

CASTINGS — Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

(*Continued from page 239*)

years, was named vice-president and treasurer. W. O. BRANDT, who was named vice-president of research in October, 1960, will continue to assist the president, Mr. Jensen.

The Denver Fire Clay Company, a producer of refractories, kilns, and related heat-treating equipment, was purchased in October, 1960, by Thermal Ceramics, Inc., and continues to retain its identity as Denver Fire Clay Company. In November, 1960, Denver Fire Clay purchased the Dickinson Kiln Co., a West Coast firm.

HOWARD M. DORWARD has been appointed product sales engineer for the wire rope sales department of The Colorado Fuel and Iron Corporation's Western Division.

Mr. Dorward has been manager of wire rope sales for the Rocky Mountain Division since 1948, having joined C.F.&I. in 1946 in the wire rope sales department.

WARREN R. SNIDER has been named manager of the newly created market development and order administration department for FWD Corporation, Clintonville, Wis., according to an announcement made by G. F. DECOURSIN, marketing vice-president.

He will be responsible for market development programs, sales engineering services to district sales managers and FWD dealers, and for administration of sales orders handled by the department. Mr. Snider joined FWD in 1940.

JOHN M. CASEY was appointed to the newly created position of sales promotion manager, according to an announcement made by ARTHUR J. LAACK, director of marketing services. Mr. Casey will assist the marketing services director, and will be responsible for the supervision of training, copywriting, and manual development functions of the department. He has been, except for military service, with FWD since 1937, when he joined the sales department.

ROBERT J. PETERSON has been named to the newly created position of distribution planning manager. The announcement was made by LLOYD PERNOT, director of domestic sales. Prior to his recent appointment Mr. Peterson was western sales manager of the domestic sales department. He will now be responsible for the recruitment of new dealers, evaluation of dealer effectiveness, and coordination of dealer development. Mr. Peterson joined FWD in 1956 as assistant to the sales manager.

HOWARD NITTEBERG has been named a territory manager for Oliver Corporation, Chicago, Ill., working out of the Omaha (Neb.) branch.

H. Nitteberg

Mr. Nitteberg was with the Oliver Omaha branch from 1948 to 1956. He recently has been a territory supervisor with another farm equipmanufacturer.

JOHN H. HINMAN has been designated honorary chairman of the board and appointed director of Woodlands by the board of directors of the International Paper Company, New York, N. Y. He will continue to serve as a member of the board of directors.

RICHARD C. DOANE, who has served as president of the company and chief executive officer succeeds Mr. Hinman as chairman of the board. Mr. Doane will continue as chief executive officer.

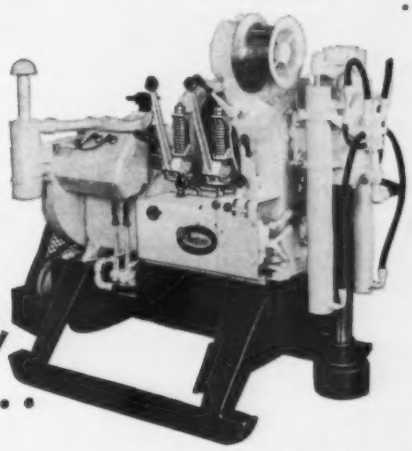
LAMAR M. FEARING was elected president, and JOSEPH P. MONGE elected vice-president and treasurer.

JACK H. HOW, president of Western Machinery Company, San Francisco, Calif., has been elected to the board of directors of Arthur G. McKee and Company, Cleveland, Ohio.

Western Machinery Company, whose operations are conducted by its Western Knapp Engineering Co. and WEMCO divisions, became a wholly owned subsidiary of McKee in January, 1961.

IT'S A FACT

NEW Longyear "38" Drill works anywhere, goes anywhere...



ALL THE FEATURES drillers have asked for are combined in the new Longyear "38" Diamond Drill. Finger-tip controls and a wide range of optional equipment put the operator in complete command. Ideal for all kinds of mineral exploration jobs, blast hole drilling and site development work. The versatile "38" has new low-range speeds, optional built-in Wire Line Hoist and hydraulic retraction. Features compact design with lightweight chassis breakdown for easier transporting. Capacity, 2800 ft. with AW rods. For information, contact our nearest office.

Longyear

E. J. LONGYEAR COMPANY
MINNEAPOLIS, MINNESOTA, U.S.A.

LONGYEAR N. V. The Hague, Holland
CANADIAN LONGYEAR LTD. North Bay, Ontario, Canada
LONGYEAR ET CIE Paris, France
LONGYEAR DE MEXICO S.A. de C.V. San Bartolo, Mexico
CHRISTENSEN LONGYEAR INDIA LTD. Bombay, India
NIPPON LONGYEAR COMPANY LTD. Tokyo, Japan

Enter 245 on card, page 241

It's NAYLOR... the Pipe and Coupling Combination for Savings!

You can't match the combination of NAYLOR Spiralweld pipe and Wedgelock couplings for saving time, work and money on pipe lines in mining service.

Your savings start with the light weight of the pipe, but there's no sacrifice of strength, thanks to the exclusive lockseamed-spiralwelded structure. Handling is simplified, installation is faster and easier, especially when you use NAYLOR Wedgelock couplings to speed connections.

For air, water, and tailings service, get the details on this NAYLOR time-and-money-saving combination. Ask for Bulletin No. 59.

NAYLOR Wedgelock couplings make a positive connection securely anchored in standard weight grooved ends. A hammer is the only tool required to connect or disconnect the coupling.

NAYLOR PIPE Company

1257 East 92nd Street, Chicago 19, Illinois

Eastern U. S. and Foreign Sales Office: 60 East 42nd Street, New York 17, N. Y.

Corns Belt Company, Griffith, Ind., following the death of the founder, FRANK CORNS, has been taken over by the Pioneer Belting and Conveyor Equipment Corporation. Pioneer is headed by ALBERT HANAWAY. The business will continue in operation as a division of Pioneer, and will retain the name "Corns."

Two executive appointments to the explosives department of Hercules Powder Company were announced recently.

HENRY V. CHASE JR. becomes director of operations for the department's commercial explosives division and ALBERT R. ELY assumes the post of manager of industrial relations. Both appointments are effective immediately. The changes are part of the company's recently announced reorganization of operating departments.

Mr. Chase, who has been the department's manager of explosives operations since 1957, joined Hercules in 1940 shortly after graduating from Dartmouth College. Most recently he was manager of explosives operations.

Mr. Ely, assistant to the department's director of operations before his new assignment, joined Hercules in 1914, about a year after the company started in business. After serving in World War I, he graduated from Penn State University and returned to Hercules after obtaining his degree in industrial chemistry.

EUGENE C. HERSCHELMAN has been appointed manager of Diamond Iron Works, division of Goodman Manufacturing Co., Chicago, Ill. Mr. Herschelman, who brings experience in the manufacture of rock crushing equipment at both Diamond and an eastern firm, assumed his new duties on March 1.

ROBERT J. TUMLINSON has joined the construction equipment product sales organization of Worthington Corporation, Harrison, N. J., as a distribution representative in the southern zone.

JOHN M. MACY has been appointed assistant to DAVID M. FIRTH, vice-president in charge of engineering for Dodge Manufacturing Corporation, Mishawaka, Indiana.

John M. Macy

In his new position Mr. Macy will help direct an extensive program of developmental and experimental engineering for the manufacture of mechanical power transmission equipment.

He joined Dodge in 1960 as a project engineer, coming from the South Bend Tackle Company, Inc., where he was vice-president for development and engineering.

ROLAND W. (JACK) JOHNSON, vice-president of Foote Bros. Gear & Machine Corporation, Chicago, Ill., has been given the additional duty of administrative assistant to the president.

Several executive appointments have been announced at Motec Industries, Inc., Hopkins, Minn.

WILLIAM F. Foss, vice-president and treasurer has been elected senior vice-president for finance and international operations.

Mr. Foss will continue as treasurer and chairman of the operating committee of the firm. He joined Minneapolis-Moline Company (the former corporate name of Motec Industries) in October 1941, beginning as junior accountant.

MARSHALL E. MUNROE JR., director of procurement, has been elected a corporate vice-president.

Mr. Munroe joined Motec Industries in 1960. He had formerly been vice-president and director of procurement for Massey-Harris-Ferguson, Inc.

BERT F. WHITBREAD has been appointed vice-president of Motec Industries, Inc., for the Mobilift Materials Handling Equipment, Mopower Construction Equipment, and Moline Automotive Divisions.

Mr. Whitbread joined Motec in August, 1960, as sales manager for construction equipment.

ATLAS
MODEL 24
BELT CONVEYOR

NEW IMPROVED DESIGN GIVES YOU

Model 24 Stationary Belt Conveyors are available for 18" through 48" belt widths with 24" and 42" deep truss frames. Designed for handling gravel, sand, stone, rock, slag, coal, ore and other bulk materials . . . the new Model 24 design provides greater capacity output and lower input power consumption.

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When dependable conveying and loading equipment is needed, be wise — ask for Atlas.

See Your ATLAS Distributor or Contact

ATLAS CONVEYOR CO., CLINTONVILLE, WISCONSIN, U.S.A.

Manufacturers of portable and stationary conveyors and bucket elevators for handling loose material such as sand, gravel, crushed stone, coal, coke, cement, etc.

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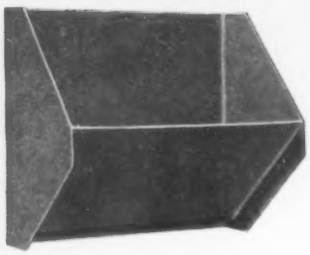
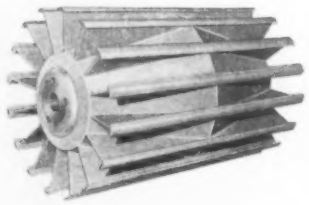
the PROFIT'S in the Bucket

with STANDARD METAL

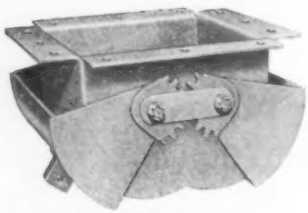
Conveying and Elevating Equipment



Continuous Elevator Bucket Style No. 2.
Styles include Salem, Style "A" and other continuous style buckets.



Wing-Type Self-Cleaning Pulley.
Dodge Taper-Lock® Hubs and Bushings Standard. Available also with solid hubs bored to specifications.



Duplex Bin Gate.
Single Bin Gates also available.

SM 18

Write TODAY FOR THE COMPLETE CATALOG AND FOR QUOTATIONS.

STANDARD METAL MFG., CO.
110 CENTER ST. MALINTA, OHIO

Enter 248 on card, page 241

● The 10,000th Scout built by the Motor Truck Division of International Harvester Company, Chicago, Ill., was driven off the final assembly line early in May at the Fort Wayne plant by D. F. Kuntz, divisional sales manager. The model shown has 4-wheel drive, and Travel-Top enclosing both the passenger compartment and pickup body. The utility vehicle transports both passengers and cargo. The Scout is being sold through the company's truck dealers and company-owned branches, but the company is also signing up new dealers.

ROBERT A. HERSTINE has been named to the sales staff of Taylor-Wharton Company, division of Harsco Corporation, High Bridge, N. J. Mr. Herstine was previously employed by Bethlehem Steel Co. and Bethlehem Fabricators.

Two companies have been named as distributors for Koehring Co., Milwaukee, Wis.

Carroll & Edwards Co., Cincinnati, Ohio, will represent the Koehring Division in southeastern Ohio.

Harris Truck & Equipment Co., Trementon, Utah, has been appointed a distributor in the intermountain area for the Koehring, Parsons, and Koehring Co. of California (Ko-Cal) divisions. Harris has been a C. S. Johnson distributor for some time.

J. W. MCMULLEN, general manager, Power Equipment Division, Allis-Chalmers Manufacturing Company, Milwaukee, Wis., is retiring after 45 years of service with the company.

ROY M. CASPER, who is a vice-president, and has been general manager, Atomic Energy Division since 1957, is replacing him.

KENNETH LINDSAY, executive vice-president of Iowa Manufacturing Company, Cedar Rapids, Iowa, retired recently.

A. C. GOSSARD was appointed to succeed Mr. Lindsay in the responsibilities of directing all domestic sales and advertising for the company. Mr. Gossard began with Iowa in 1925, handling traffic, purchasing, and various other jobs.

A. J. HERRMANN has been appointed engineering product manager for Goulds Pumps, Inc., Seneca Falls, N. Y. He had previously been vice-president and chief engineer for Dean Bros. Pumps, Inc., Indianapolis, Ind., for eight years.

ERNEST A. NELSON has been appointed to the sales and service staff of the Los Angeles branch office (Compton, Calif.) of Fuller Co., Catasauqua, Pa. Mr. Nelson, who graduated from the University of Redland with a degree in engineering, includes in his background, in addition to military service, summer employment as a draftsman with the Donald R. Warren Co. in Los Angeles.

When you buy Timken® rock bits you are investing in a better value for today and in the future

Remember when you used to get 300 feet of hole from one rock bit in granite? It wasn't very long ago. Just about five years. Would you settle for the same footage today? Why should you? You can get 500 feet under identical conditions with a bit that costs less than your 300 footer.

This extra footage, this reduction in cost per foot of hole, is the sum of many improvements in rock bit design, materials and manufacture—most of them pioneered by the Timken Company.

A large share of every Timken Company sales dollar is plowed back into research and development. For example, we lease a mine to conduct experiments that lead to better, more durable, more economical rock bits. Our Research Laboratory developed a new bonding process to hold carbides more securely to bit bodies. Our Rock Bit Engineering Department is constantly field testing new applications to overcome drilling problems. You see the results—and count the savings in dollars and cents—every time you drill a hole with Timken bits.

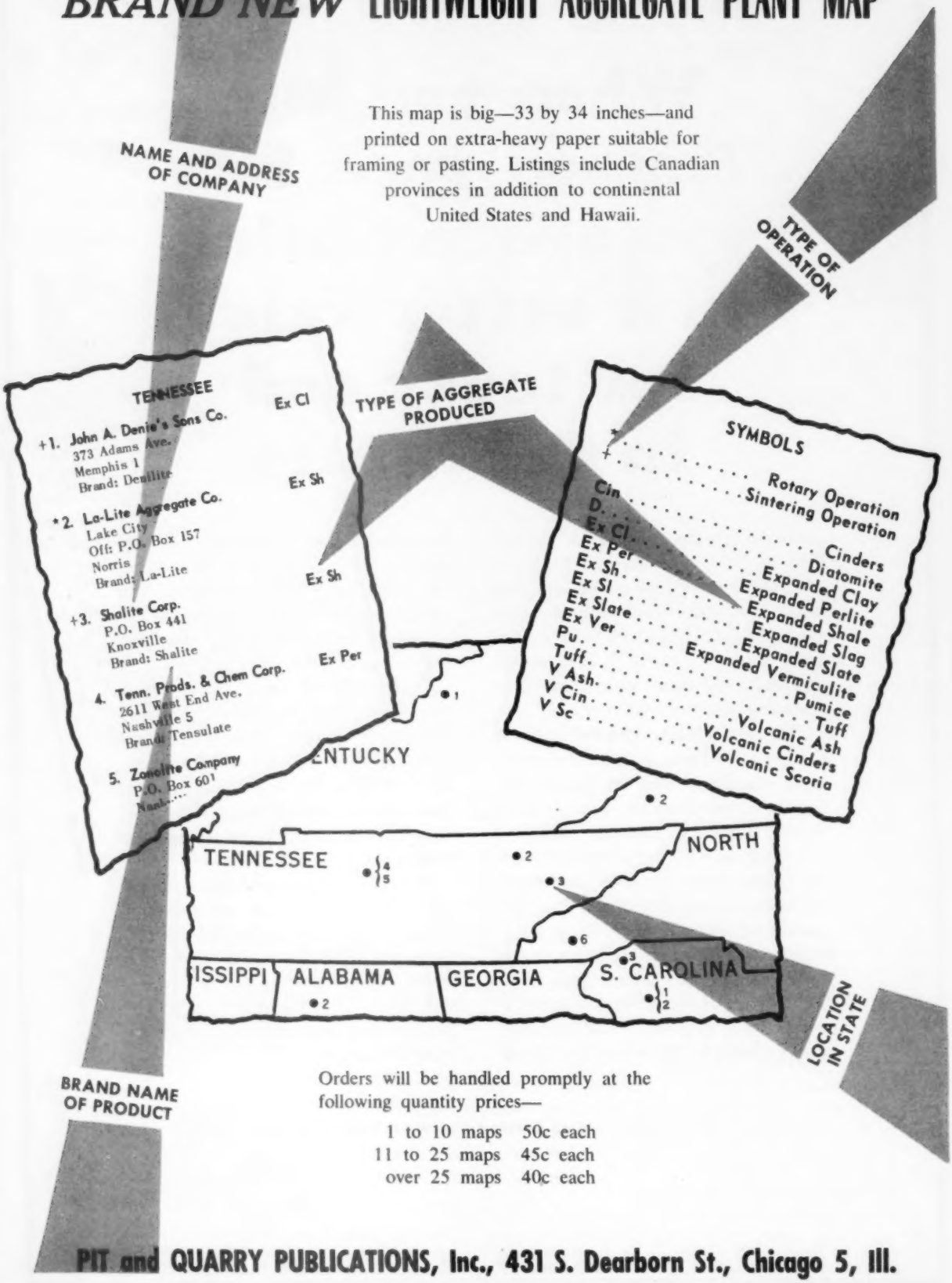
Underlying all these technological advancements is the philosophy of the Timken Company—Service to the customer. Our rock bit sales engineers are available for immediate service from branch offices and warehouses, located in principal cities throughout the country.

Customer service, product excellence and facilities to pioneer new developments have enabled the Timken Company to become one of the world's largest manufacturers of removable rock bits. It explains in part why Timken rock bits are preferred by so many drillers.

The Timken Roller Bearing Company, Canton 6, Ohio

Here's what you'll find on Pit and Quarry's BRAND NEW LIGHTWEIGHT AGGREGATE PLANT MAP

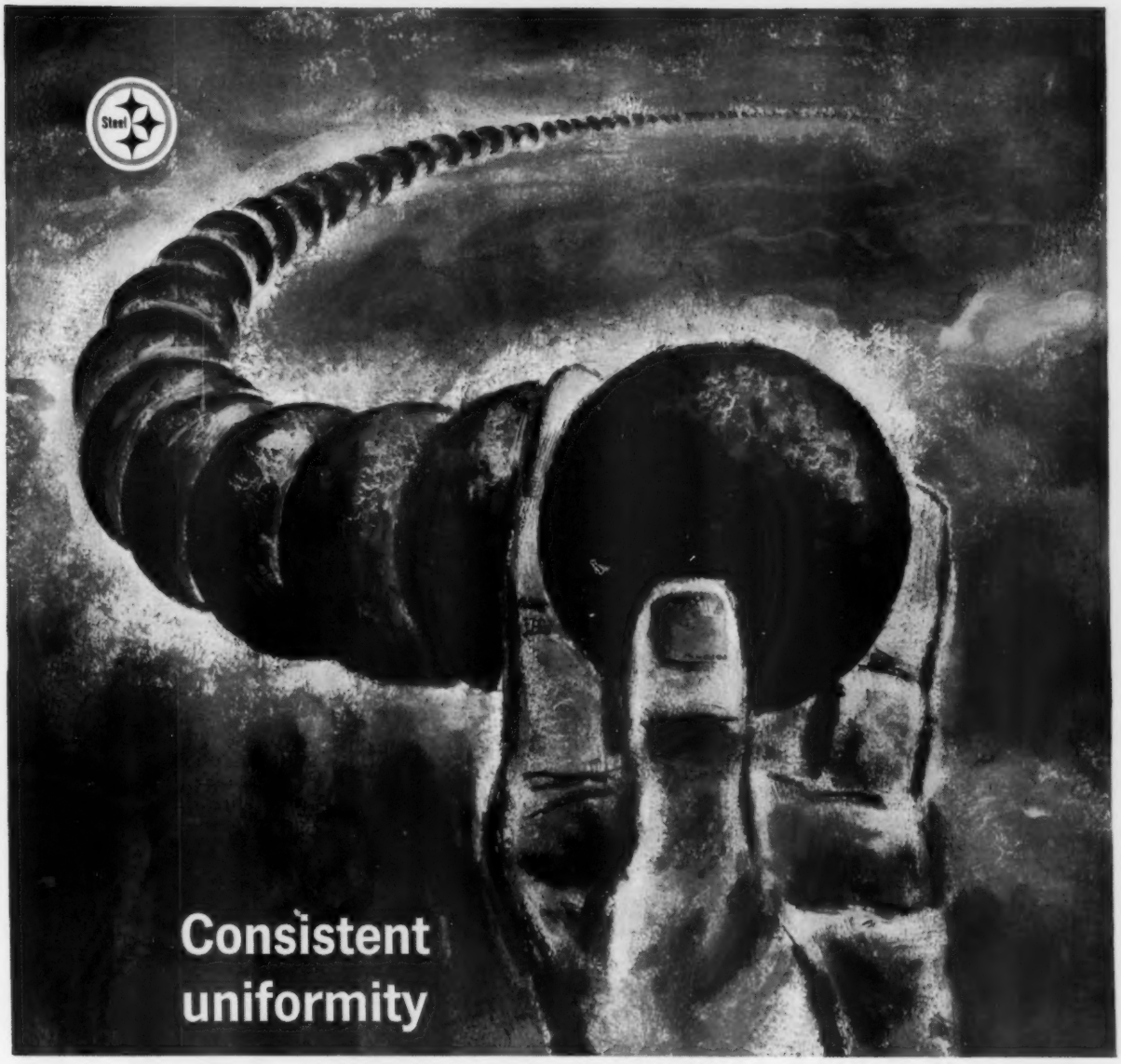
This map is big—33 by 34 inches—and printed on extra-heavy paper suitable for framing or pasting. Listings include Canadian provinces in addition to continental United States and Hawaii.



Orders will be handled promptly at the following quantity prices—

1 to 10 maps	50c each
11 to 25 maps	45c each
over 25 maps	40c each

PIT and QUARRY PUBLICATIONS, Inc., 431 S. Dearborn St., Chicago 5, Ill.

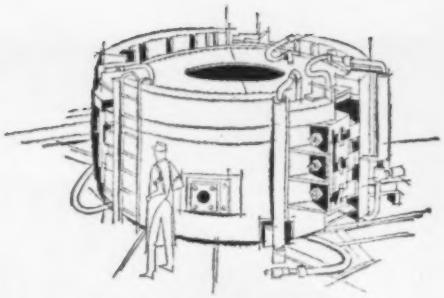


has earned customer acceptance

Consistent uniformity, right down to the core, is a big reason why more than a million tons of Sheffield Grinding Balls have been used in every kind of grinding job, around the world. They're uniformly hard, uniformly tough, with a uniformly dense grain structure throughout. That's why Moly-Cop Balls keep their sphericity longer, give a better grind at a lower cost per ton. It's the result of Sheffield's constant quality control in alloying, forging and heat-treating. **Sheffield Division, Armco Steel Corporation, Sheffield Station, Kansas City 25, Mo.**

SHEFFIELD
MOLY-COP
Grinding Balls

ARMCO Sheffield Division



Miss Southern Tire Announces:

Something BIG!

World's Largest Retreading Mold

Southern Tire Company now offers the largest production capacity and range of sizes of any retreading shop in the world. New equipment enables Southern Tire to retread sizes no other plant can handle. Southern's new giant-tire mold, occupying an area of 2000 square feet, can handle the following sizes: 26.5 x 29, 29.5 x 35, 3000 x 33, 33.5 x 39 and 37.5 x 33.

For quality rubber, on-site pick-up and delivery, specify an Independent — specify Southern Tire.

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Concrete & Rock Products

PROCESSING & HANDLING EQUIPMENT

ALL NEW SINCE 1957

7'x26' ALLIS CHALMERS BALL MILL

PLUS

ALLIS CHALMERS 3'x3' ROD MILL—#322 HYDROCONE CRUSHER & 24"x12" JAW CRUSHER—500' SCREW CONVEYORS—SYNTRON FEEDERS—CARRIER CONVEYORS—BUCKET ELEVATORS—STORAGE BINS—BATCH SCALES—DUST COLLECTORS—7'x120' & 5'&60' ROTARY KILNS.

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INDUSTRIAL PLANTS CORPORATION

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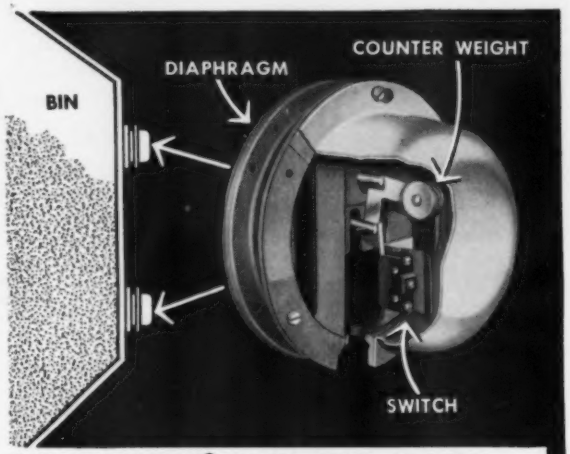

BIN-DICATOR® PAYS FOR ITSELF FIRST TIME IT PREVENTS BIN OVERFLOW, CONVEYOR CLOG, ELEVATOR CHOKE-UP, MACHINERY DAMAGE, REPAIR SHUT-DOWN

If you handle bulk material you probably need Bin-Dicators. The nominal cost of this protection and automatic control makes it the lowest-cost modernization you can buy. Available with Explosion-Proof Switch.

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there's a big difference in

DRAGLINE BUCKETS

...HENDRIX

makes that difference!

The difference in Hendrix Dragline Buckets shows in design and engineering . . . in the ultimate of working efficiency that marks every Hendrix bucket . . . no matter what the job.

The final results . . . PROFITS on every operation!

Hendrix Lightweight Dragline Buckets

¼ to 40 Cubic Yards
Perforated or Solid

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MANSFIELD, LOUISIANA

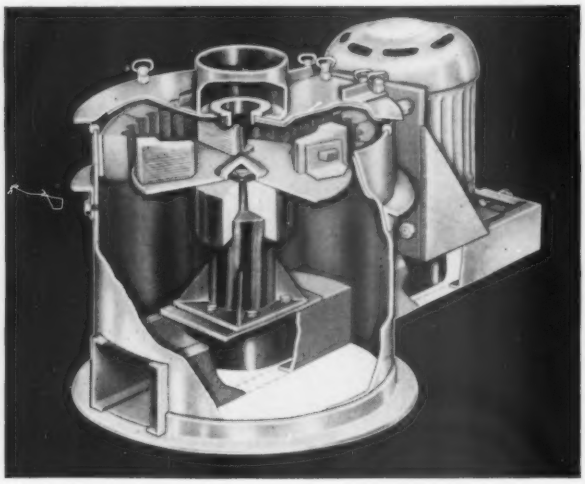
HAVE YOU CHECKED THE NEW, BETTER WAY TO CRUSH?

enthusiastic users say the

TORNADO

SQUARE IMPACT CRUSHER

turns out a dense graded cubical product—yet it is the most versatile crusher ever put on the market. Produces any range of crushing, to screen



to any gradation required, in an almost unbelievable number of tons per hour, and does it at less cost than Rod Mills or other types of Crushers priced up to TEN TIMES AS MUCH!

Virtually no "down time"—you can keep it in operation 22½ hours a day, 7 days a week, year after year.

Light in weight—requires no massive foundation and little head room. Power requirement amazingly low. No zincing or babbitting needed.

Write, wire, or phone collect for details. We'll run a sample of your own material through the Tornado to PROVE how much it will do for you.

WERCO Steel Company
2151 East 83rd Street, Chicago 17, Ill.
Phone ESsex 5-8446
Cable Address, IMPACTOR

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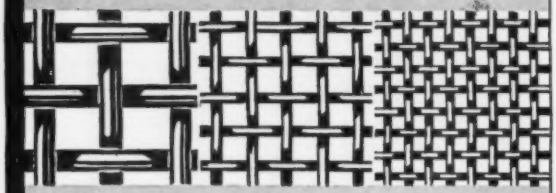
STRONG AS ARMOR
NAT-ALOY
Woven Wire Screens



Reliable Nat-Aloy woven wire cloth is specified throughout industry for maximum screening accuracy and economy.

Available in flat surface, lock crimp, double crimp, rectangular and long slot openings. All sizes, meshes and gauges—prompt shipment.

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OIL TEMPERED WOVEN WIRE CLOTH
★ GREATER RESISTANCE TO ABRASION
★ MORE TONNAGE AT LOWER COST
★ FEWER COSTLY CHANGE OVERS

Write for information. Also stainless steel wire screens.

NATIONAL WIRE CLOTH COMPANY
252 W. Fairfield Ave., St. Paul 1, Minnesota

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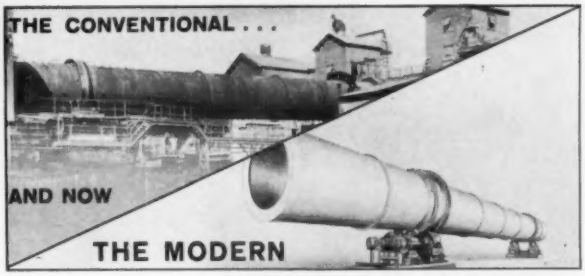

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The Vulcan Iron Works, Inc., in Wilkes-Barre has the "know-how" when it comes to designing and building rotary kilns for any application.

From kilns built years ago which were held together by rivets, TO the modern patented Vulcan kiln of today, electronically welded and designed for years of trouble free service. . .

If you are in the market for a kiln, why not let Vulcan give you some suggestions and preliminary drawings for your consideration.

"THE OLDEST NAME IN ROTARY KILNS"

VULCAN IRON WORKS, INC.,
MEMBER: NATIONAL LIMESTONE INSTITUTE, INC.
WILKES-BARRE, PA. • CABLE ADDRESS: VULWORKS

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Electrical & Mechanical Engineer. 13 years experience in lime manufacture, 4 years in cement, seeks connection with lime, cement or gypsum organization. Plant operation and management experience. Will relocate anywhere in U.S.A.

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We are seeking a manager for a newly formed division of our company, which will supply a complete line of machinery and equipment to mines and quarries.

Must have a broad knowledge of the field—prefer sales-engineering background or equal.

Send complete resume. All replies will be strictly confidential. You will be contacted by the company president.

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THOMASVILLE DRILLING & TESTING CO.
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Site Tests, Plans, Estimates & Supervision for Underground Construction, Mining and Control of Rock and Water

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Need concrete products plant superintendent, packerhead, spun and vibracast; also concrete block. Send all qualifications, education and experience records. Location—Pacific Coast. Replies confidential.

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PORTLAND CEMENT TECHNOLOGY

Raw materials deposits. Plant operation. Experimental engineering. Research. Development of plant equipment and processes.

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Well-established manufacturer of complete line concrete batching equipment; bins, silos, conveyors, etc. Desires active distributors. Attractive compensation arrangement and protected territory if desired.

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Anywhere

SPECIALIZING IN QUARRY BLAST HOLES USING
INGERSOLL-RAND DRILLMASTERS

Hole sizes from 4¾" through 6½"

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CHIEF ENGINEER

Large new cement manufacturing company on the East Coast invites applications from experienced professional men with an exceptional record of executive achievement for the above-mentioned top level appointments.

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Responsible for all aspects of operations, sales and administration. Experience in all these fields and in the cement industry desirable. Opportunity for advancement.

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Responsible for administration, finances, accounting and legal matters. Opportunity for candidates with good professional background and experience in similar position in heavy industry.

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Engineering degree required. Several years of experience in handling all aspects of engineering in heavy industry and some experience in cement manufacture required.

All applications will be held strictly confidential.

Full personal particulars with references should be submitted in writing to

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(New York City)

For old established engineering firm specializing in cement plants.
Opportunity to become Chief Electrical Engineer in 5-6 years.
Requirements: Graduate engineer with minimum of 10 years experience. Thorough knowledge of power layout and all electrical and power equipment used in cement plants. Experience with control panel construction, selection of electrical equipment, instruments and cost estimates.
Send complete resume of education, experience and salary expectations to:

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ASSISTANT CHIEF CHEMIST PROCESS ENGINEER

Leading West Coast cement manufacturer has position openings for Assistant Chief Chemist & Process Engineer. B.S. in chemical engineering or chemistry required. 2 years cement plant experience desirable. Activity in control, process control & process engineering. Excellent chance for advancement. Submit resume to

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DISTRIBUTORS to market our complete line of custom-built Vibrating Screen Units throughout U.S.A. 35 Yr. old Heavy Duty "NIA-TEX" Line (Positive-throw). 22 Yr. old Light Duty "RUMBA" Line. Exclusive franchise to Industry you now serve. Liberal Commissions. Furnish complete resume to:

HUTCHISON MFG. CO.
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POSITION WANTED

Production or plant manager lime or rock crushing plant, 25 years experience in production & maintenance. Age 48, location South or Southwest preferred.

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Salesman — Wanted

With rapidly growing organization. Must have following in Pit & Quarry & Mining trades. Exceptional opportunity to increase present income—All inquiries strictly confidential.

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For large western operation. Graduate M.E. or equivalent with good background in Gypsum Plant maintenance procedures, supervision, and general plant engineering. Salary commensurate with record of accomplishment. Submit full details of education, experience and references.

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WANTED: used steel grinding balls 1" to 3" in diameter.

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FOR INCREASED PROFITS AND LOWER OPERATING COST

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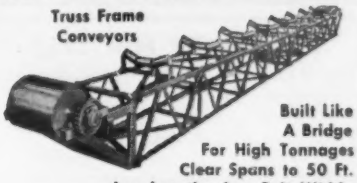
8" Jr. I Beam Frame Conveyors



Truss Frame Conveyors

Built Like A Bridge For High Tonnages Clear Spans to 50 Ft. Any Length - Any Belt Width.

Bonded Pre-Fab conveyors are designed to give you fast, efficient and economical movement of your bulk materials at low cost, with a minimum of maintenance. Sand, Gravel, Crushed Stone, Chemicals, Fertilizer and Coal are just a few of the materials that can be transported on these conveyors.

Three different designs offer a wide choice to fit the particular application and budget. All are jig built for quick, easy installation.

BONDED 8" JR. I-BEAM CONVEYOR. A low cost unit for moderate speeds and capacities. Ideal for low headroom installations above or below ground.

BONDED TRUSS FRAME CONVEYORS. Available in 18" and 30" deep frame. Built like a bridge. For heavy loads, higher speeds and capacities, clear spans to 50 feet. This will vary with depth of truss, accessories required, etc.

We take our loss on our stock of short length belting. You can save as much as 50% on **BONDED CONVEYORS** with conveyor belting in two pieces. Belt is new stock, guaranteed to meet listed specifications.

A full line of accessories is always available, including carrying and return belt covers.

REMEMBER. You Save Up to 50%—Conveyor Prices Include Belting.

8" JR. I BEAM FRAME CONVEYOR

Belt Width	Conveyor Length	Price	Add or Deduct Per Foot
14"	25'	$ 766	$16.62
16"	25'	786	17.10
18"	25'	830	18.03
20"	25'	871	19.30
24"	25'	922	20.68
30"	25'	1012	23.17
36"	25'	1105	25.91

WRITE FOR BULLETIN #1138

TRUSS FRAME CONVEYOR

18" TRUSS		30" TRUSS	
Price	Add or Deduct Per Five Feet	Price	Add or Deduct Per Five Feet
$901	$94.80	$965	$109.00
923	97.69	987	112.00
959	102.42	1104	117.20
998	108.45	1150	123.81
1067	116.24	1201	130.66
1140	129.37	1297	144.18
		1393	157.64

WRITE FOR BULLETIN #1189

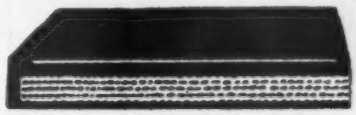
TESTED CONVEYOR BELTING

WE PAY FREIGHT ON 200 POUNDS OR OVER. QUANTITY DISCOUNTS ON 300' OR OVER UPON REQUEST

Guaranteed to meet listed specifications. Tested by the Engineering Laboratory of one of the largest universities in the U.S.

Other widths, plies, duck weights and cover thickness available at low prices.

WRITE FOR FREE SAMPLE & BULL. #1279



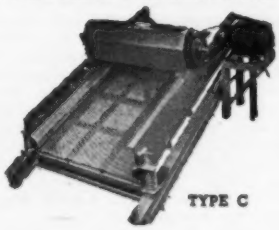
MAJOR BRAND: 12# to 15# Friction Pull. 800# to 1000# cover Tensile. Heavy Duty. 28 oz. Cotton Nylon Duck. Used in moving boxes, bags, coal, sand, gravel, crushed stone, refined sugar, salt, coke, earth and materials when abrasion is not too severe.

Width	Ply	Top and Bottom Covers	U. S. Made Per Foot
12"	3	1/16"x1/32"	$2.31
18"	3	1/16"x1/32"	2.88
14"	4	1/8"x1/32"	3.06
16"	4	1/8"x1/32"	3.21
18"	4	1/8"x1/32"	3.56
20"	4	1/8"x1/32"	4.11
24"	4	1/8"x1/32"	4.61
30"	4	1/8"x1/32"	5.64
36"	4	1/8"x1/32"	6.69

MAJOR BEE BRAND: 16# to 19# Friction Pull. 2400# to 3000# Cover Tensile. Heavy Duty. 28 oz. Duck. **Domestic belt has cotton nylon Duck. Imported belt has cotton Duck.** 1/8" top rubber cover x 1/32 bottom rubber cover. For more severe service, high tonnages and abrasion resistance. For hauling stone, mineral ore, concrete, cement, coal and other similar materials, both wet and dry.

Width	Ply	U.S. Made Per Foot	Imported Belt Per Foot
14"	4	$3.31	$3.17
16"	4	3.74	3.36
18"	4	4.14	3.73
20"	4	4.72	4.32
24"	4	5.35	4.86
30"	4	6.56	5.98
36"	4	7.95	6.95
24"	5	6.25	5.63
The Following Have 1/16" Top Rubber Cover x 1/32" Bottom Rubber Cover:			
12"	3		$2.41
18"	3		3.23
24"	3		4.24

NEW BONDED® SPECIAL SERVICE & HEAVY DUTY VIBRATING SCREENS



TYPE C

- ✓ LOW PRICES
- ✓ HIGH CAPACITIES
- ✓ FACTORY TESTED & BALANCED
- ✓ CONTROLLED VIBRATION
- ✓ SHARP, CLEAN SEPARATION
- ✓ CONTINUOUS OPERATION
- ✓ REVERSIBLE SCREEN CLOTH FOR LONGER LIFE
- ✓ LOW MAINTENANCE

SPECIAL SERVICE SCREEN, Type C. Series 2 with opening in top deck up to 2" for scalping, etc. Series 1 for fine screening and dedusting. Ideal for portable or temporary installations. 2'x4' to 3'x8'. 1 to 3 decks. **WRITE FOR BULLETIN #1224.**

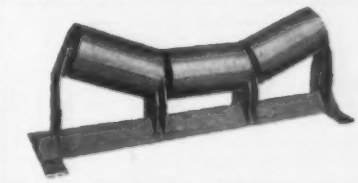
TYPE B

Heavy Duty Models, Type TB; two-bearing, positive throw, eccentric shaft screens, suspension mounting. 3'x6' to 4'x14', 1 to 5 decks. Prices for base mounting and 4-bearing screens on request. **WRITE FOR BULLETINS #1087 and #1279.**

Model Number	Screening Area	Number of Decks	Price
124C	2'x4'	1	$ 487
224C	2'x4'	2	519
324C	2'x4'	3	616
126C	2'x6'	1	519
226C	2'x6'	2	551
326C	2'x6'	3	660
136C	3'x6'	1	639
236C	3'x6'	2	757
336C	3'x6'	3	1052
138C	3'x8'	1	743
238C	3'x8'	2	897
338C	3'x8'	3	1096
136TB	3'x6'	1	1243
236TB	3'x6'	2	1316
336TB	3'x6'	3	1393
138TB	3'x8'	1	1299
238TB	3'x8'	2	1393
338TB	3'x8'	3	1429
2410TB	4'x10'	2	2112
3410TB	4'x10'	3	2244
2412TB	4'x12'	2	2279
3421TB	4'x12'	3	2614

Other sizes available. Prices quoted on request.

BONDED® IDLERS & RETURN ROLLS



3-roll, 5" diameter Troughing Idlers for:			
14" belt	$18.75	24" belt	$22.75
16" belt	20.50	30" belt	23.85
18" belt	21.90	36" belt	24.90
20" belt	22.10	48" belt	27.50
1-roll, 5" diameter Return Rolls for:			
14" belt	$ 8.50	24" belt	$11.00
16" belt	9.00	30" belt	12.50
18" belt	9.50	36" belt	13.75
20" belt	10.00	48" belt	18.50

All steel. Interchangeable with other well-known makes. Furnished with replaceable prelubricated sealed ball bearings. Maintenance is negligible. **WRITE FOR BULLETIN #1138.**

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110 BELLEVUE **Mfrs. of Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers, Feeders and Bucket Elevators** **COLUMBUS 7, OHIO**

MAKE MONEY
BUY THIS EQUIPMENT

QUARRY EQUIPMENT

Cedarapids 4A 2540 primary.
Cedarapids 3B 1036 scalper.
Cedarapids 3C 4024 secondary.
Telsmith 2536 Primary Crushing Plant.
Pioneer 305W Washing & Screening Plant.
Cedarapids #3 Kubit Breaker. Rebuilt.
Cedarapids 3033 Hammermill. Rebuilt.
Cedarapids 2033 Hammermill. Rebuilt.
Cedarapids 1036 plain bearing jaw.
Farrell 8½ x 13 Blake type jaw.
Telsmith 40B secondary gyratory.
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Telsmith Pulsator, 4' x 12', 3-Deck Screen.
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Cedarapids 5' x 12', 2-Deck Riprap Screen.
Cedarapids 42" x 10' Apron Feeder.
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18", 24", 30", 36" conveyors & belting.

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Lorain SP-424, 22½-Ton Self-Propelled Crane.
Lorain MC-414, 20-ton Moto-Crane. Reconditioned.
Lorain MC-254, 15-ton Moto-Crane.
Lorain SP-110, 10-Ton Self-Propelled Crane.
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Caterpillar D-4 tractor only.

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Adams 412H Diesel Grader. Reconditioned.
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SCREENS: 4x12 & 5x12—2 or 3 DK.
15x24 & 30x36 Portable Crushing Plants
#5057 5-Roller Raymond Mill—H.S. or L.S.
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Page 6 Cubic Yard Scraper Bucket For Unloading RIP RAP From Barges & Placing, Like New Condition, Used 30 Days. $3,100.00

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P & H 1400 Diesel electric shovel. 4 cu. yd. dipper, 32' boom with large amount of spare parts. **$48,500.**

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Marion, Model 490 E electric shovel, 2½ Amsco dipper, 29' boom. Excellent condition. **$14,500.**

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1—13"x30" Farrel-Bacon Type B Jaw Crusher.
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150'—8" Fuller Huron Airslide with Spencer Blower.

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#5060 Dixie Mogul Hammermill
SX13 Penna Hammermills, 400 HP
Heil Patterson Crusher, 100 HP
Raymond #50 & #40 Impact Mills
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535'—24" Troughing Belt Conveyor
Bucket Elevators 45' to 90' Centers
100 Steel Tanks, 1000 to 350,000 gal.

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Rated Cap.—6 Ton

Mast	— 95′	2 Sections — 32′ — 0″ 1 Section — 30′ — 0″
Boom	— 80′	2 Sections — 30′ — 0″ 1 Section — 20′ — 0″

Powered by 3 drum electric Hoisting Engine, also has power swingers.

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9″ Screw Conveyor Complete with Ends, Hangers, Gearmotors (250′ avail.)
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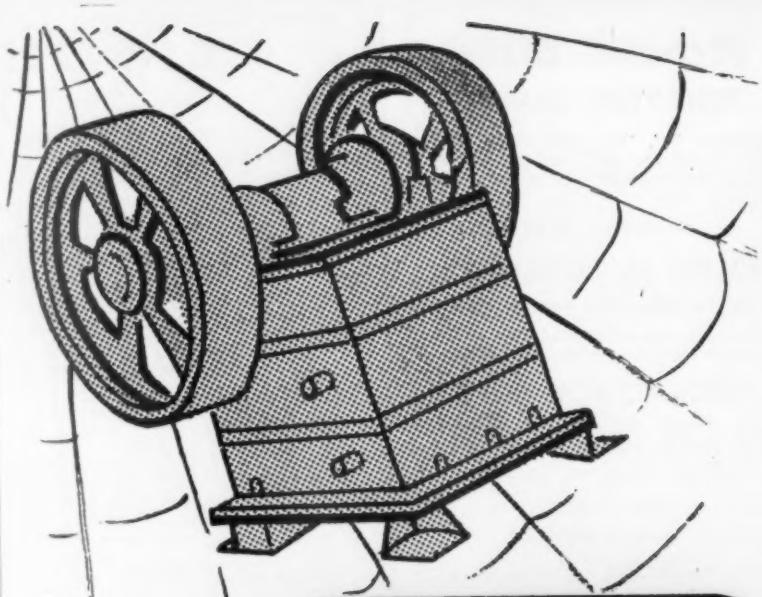

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Allis-Chalmers 5' x 5' ball, 75 HP

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Farrel 36" x 15" jaw crushers
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DEPENDABLE USED MACHINES

SPECIAL: Minn.-Moline tractor w/hi-lift bucket & backhoe

Unit #614 ½ yd. backhoe
8'CMETCO 202 Rola Paver
Adams Tandem Graders 42-C
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3600' Joy 600 HP New 1958

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25-ton Industrial Brownhoist with D13000 Cat. diesel & 60 ft. boom

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48" & 20" Traylor with motors
12", 16", 20", 36" Allis Chalmers
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6' x 4' CIW, 6' x 9' Traylor, 5' x 5' Allis Chalmers
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3' x 8", 3' x 24", 5' x 22" and 10' x 48"

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7' x 15' Marcy Open End 300 HP Motor

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24" x 24" Bagle
30" x 48" Gruendler 3XB
40" x 33" Cedar Rapids
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ML-309 Moto-Loader,® with 3-yd. bucket, digs and loads up to 3,000 tons a day

Even with travel distances of up to 150 ft. from bank to hopper, this Lorain ML-309 Moto-Loader digs, hauls and loads the primary crusher with as much as 3,000 tons of shot lime rock in a 10-hour day. It is working in the quarry of the R. J. Jager Gravel Company, St. Paul Park, Minnesota.

It is on steady-producing, rock-hard jobs like this, that the ML-309 proves that the right machine was selected. Balanced power, balanced weight and balanced controls provide fast, high-production cycles. Ranges that can't be beat in its size give reach and dump height to handle the big jobs. And exclusive design features give sturdy reliability for long-time, low-cost performance.

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One-foot control of forward and reverse travel and speed. Leaves both hands free for steering and other controls.

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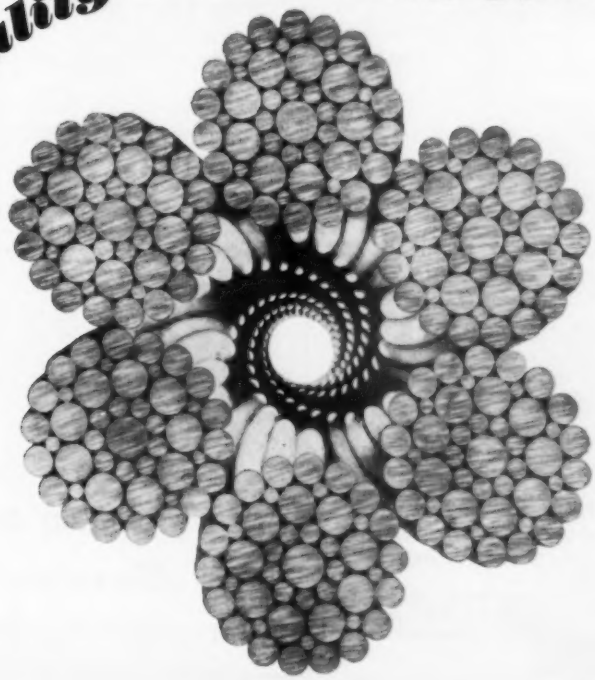

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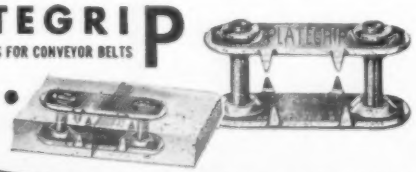
PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. *Write for Catalog Sheet.*

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NEW WEMCO LOG-WASHER *solves coarse aggregate washing problems*

Spiral off-set paddle design provides major breakthrough for handling hard-to-clean deposits.

This latest addition to the WEMCO line is more than just another Log-Washer. Field-proved features make it the most economical, easiest to operate and most effective machine for eliminating clay balls, agglomerations, soft fractions and coatings from coarse aggregates.

Key to its unique performance: WEMCO's specially-developed spiral off-set paddles which mesh in sequence, provide continual scrubbing action of material—without load shocks or power peaks. Scrubbing effect and capacity are greater—with less power required.

Other features: two-piece replaceable transport action paddles; improved self-supporting modular tank design with large clean-out doors; modern oil bath drive mechanism; externally-mounted lower bearings.

The new WEMCO Log-Washer promises substantial savings in your operation—in the toughest coarse aggregate washing problems.

Call your nearest WEMCO representative for complete information —or write direct to:

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Western Machinery Company
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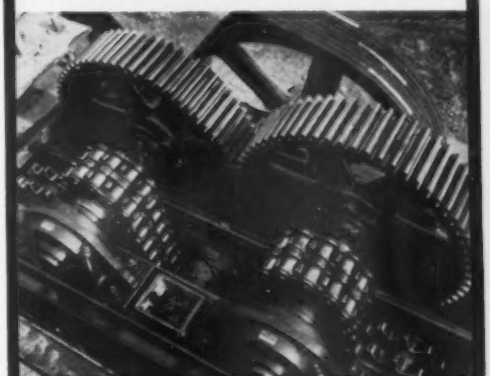
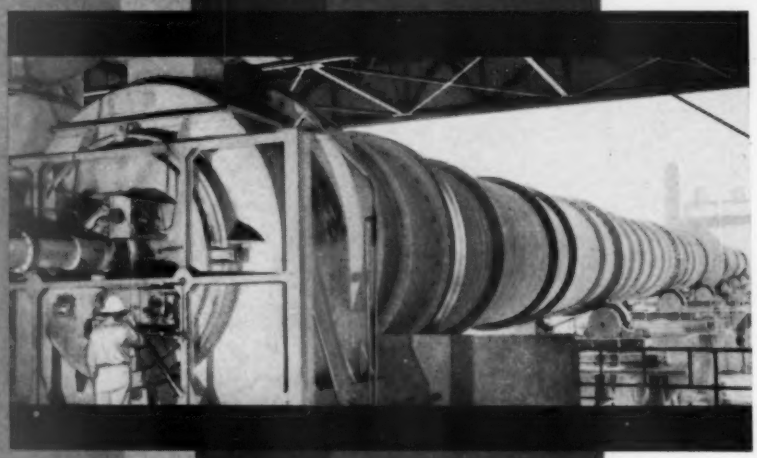
Combined action of spiral off-set and pitched paddles increases effective scrubbing.



WEMCO's drive mechanism is designed to eliminate problems associated with this type of unit. Logs are chain driven, gears and pinions of twin drive-shafts are synchronized. Lubrication of drive mechanism is effected by totally-enclosed oil bath.

TRAYLOR FIRST



Why this 1933 first welded kiln could be the key to your company's profits in the 60's

For the simple well-proved reason that they're better, kilns of all-welded construction are pretty much "standard" today. Important to keep in mind: the standard was set by Traylor . . . builder of the first welded kiln in 1933.

A radical innovation a generation ago —but why so important now? First and obviously, it means that Traylor has the longest record of experience in this special kind of equipment.

More important still: It's merely one example of Traylor's coming up first with new ideas to meet changing needs. Benefits of other Traylor "firsts"—some dating before 1933, many since—are being reaped today throughout the industry, quite likely already including your own plant. Traylor built, for example, the first 60-inch primary gyratory crusher and the first large ball mill.

Today Traylor's proved capacity to pioneer sound innovations in kilns, mills and crushers is enhanced by expanded research capabilities and process know-how.

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See Pit and Quarry Handbook for details and specifications.

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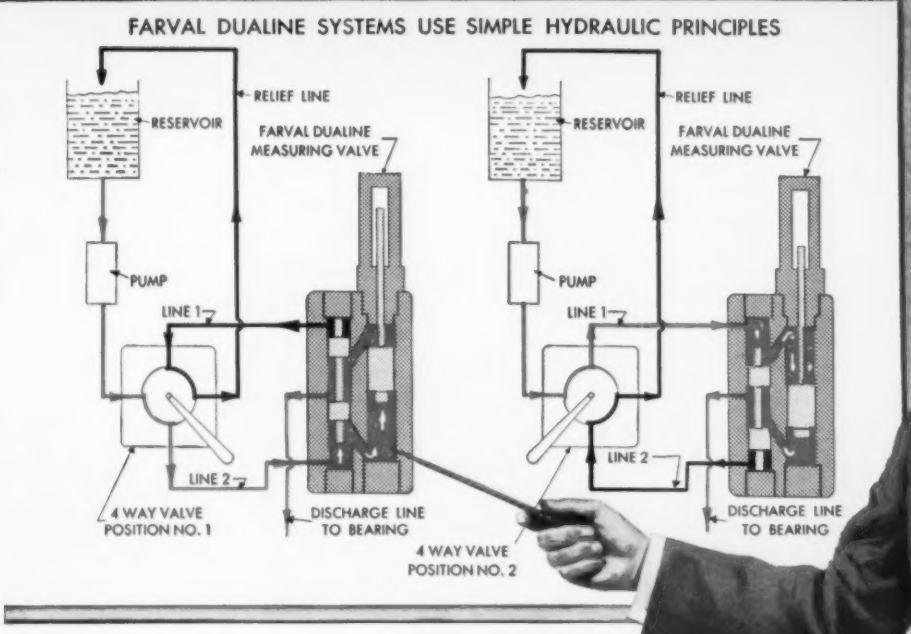
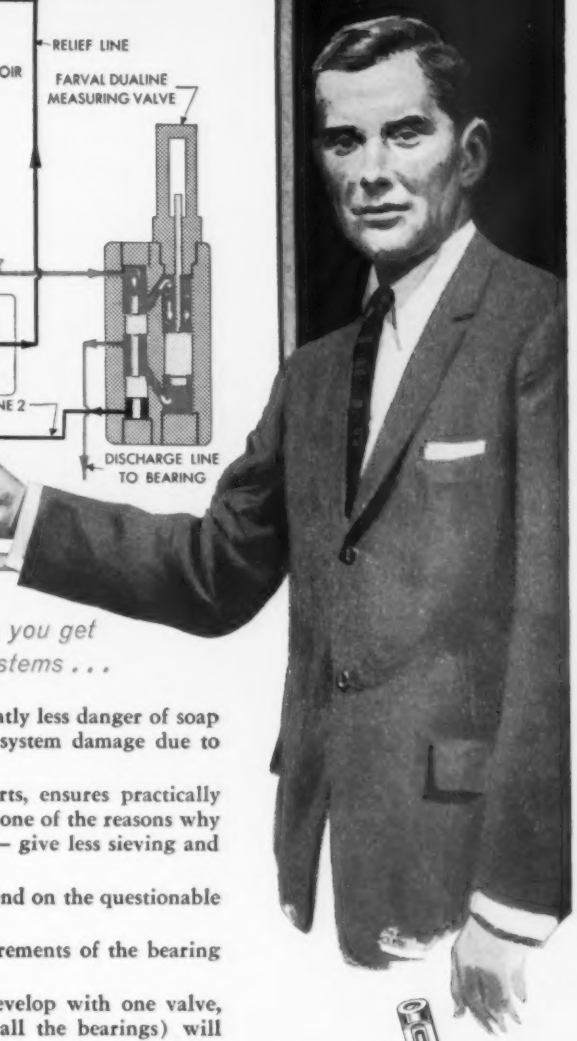
FARVAL
—Studies in Centralized Lubrication
No. 246

"For positive lubrication of large, medium and heavy-duty installations . . . it's a Farval Dualine System!"





With Farval Dualine centralized lubricating systems you get the following distinct advantages over other type systems . . .

(a) Much lower operating pressures with consequently less danger of soap separation on grease systems. Also, less danger of system damage due to high lubricant pressures.

(b) Large lubricant passages with no pinhole ports, ensures practically full pump pressure for every metering valve. This is one of the reasons why Farval Dualine systems operate on lower pressures — give less sieving and working of lubricants.

(c) Positive indication at each bearing — does not have to depend on the questionable action of a single indicator at the pump.

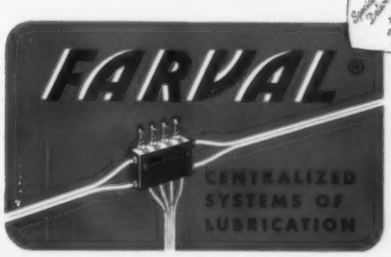
(d) Each metering valve individually adjustable for the requirements of the bearing it serves.

(e) Independent metering valve operation. Should trouble develop with one valve, the system will continue to operate. Only one bearing (not all the bearings) will require hand lubrication until trouble is corrected.

(f) True lubricant metering. Quantity of lubricant delivered to one bearing is not dependent on any other valve in the system.

(g) Much easier to spot and correct trouble.

Check with your Farval Representative and see how these versatile systems can improve production operations — reduce costs. Or write for free Bulletin 26-T containing complete engineering information on Farval Dualine systems.



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Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers is an experienced designer and builder of all types of facilities for the Minerals industry. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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